1960'S OFFICE TOWERS IN THE CITY OF LONDON: OBSOLETE OR RECYCLABLE?

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ABSTRACT

The purpose of this study was to investigate what the future is for the 1960's office towers in the City of London which were due to be demolished and rebuilt following the extraordinary property boom in London in the late 1980's, but which now, due to market conditions, will not be for the foreseeable future. Many of the 1960's buildings were judged to be obsolete during the 1980's. The question is whether this is still true or if changes in office technology, work patterns, building design and intelligence and potentially, legislation are altering users' perception of and ability to use older 'modern' buildings.

The methodology of this thesis involved the analysis of three case studies of 1960's office towers, of the same age, with different floor plate layouts, in approximately the same location. Inspections, analysis of qualitative and quantitative data, and meetings with the owners and professionals involved were carried out. This information was then built on by research in the fields of office technology, work practice and future building types including green, energy and intelligence issues. An overview of the theories of obsolescence is also given, along with a history and analysis of the problems of 1960's towers. The final analysis sought to find what made the life cycle stages of the three buildings so different and what this indicated about their ability to be recycled.

Two of the three case study sites appeared to have a healthy future. One had already been successfully recycled eight years earlier. The second had recently been cosmetically refurbished internally and the third seemed to really be obsolete, since the combination of poor floor plate layout and the costs of necessary basic renovation probably outweighed the possible benefits, making the decision to mothball appear to be the correct one.

The conclusion is that some of the office buildings of the 1960's can be recycled for many groups of office users due to technical, environmental and work practice change, but that the floor layout, internal configuration and condition of the services are important factors in determining obsolescence. A deciding factor will be whether future occupiers can tolerate the image of an older building.

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CHAPTER 1

INTRODUCTION

1.0 Context

> "Except for its rebuilding after the Great Fire and the Blitz, the City of London has never in its long history undergone such drastic redevelopment as at present. From the beginning of the century to the outbreak of the Second World War only about a fifth of the buildings in the City were redeveloped. Between 1983, when the impending impact of 'Big Bang' and the growth of international securities trading first began to be felt, and the year 2000 about a third - if not a half - of the floor space in the City and the fringes will be developed yet again, and the financial City will have spread well beyond the boundaries of the geographical City into Docklands, the West End, and the South Bank." Francis Duffy[1]

London has undergone vast changes in the 1980's and even if Duffys' predictions in 1989 are now not entirely accurate, at least 30% of the City will have been rebuilt between 1985 and December 1993[2]. Much of this was, however, redevelopment of older, pre World War Two stock with only a 12% net increment between 1986 - 1991[3]. During the recession of the early 1990's the building boom has ground to a halt with vacancies climbing to 18% by mid 1992,[4] and 14.46 million square feet of new and second hand space available with another 2.5 million in the pipeline. Other research quotes[5] vacancy rates at "just under 20% of the total stock in the City Market area", but market areas can differ by researcher. The impacts of likely future mergers and shrinkages in the City's financial center will also produce less demand for office space impacting take-up.

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[1]Duffy F & Henney A The Changing City Bulstrode Press London 1989 p13.
[2]Cassidy M 'A City in Evolution' City Changes Ed. Burdett R The Architectural Foundation London 1992 p9.
[3]Corporation of London Schedule of Development - December 1991 London 1992.
[4]Jones Lang Wootton 'The City Office Quarterly Review - First Quarter 1992' London 1992 p3.
[5]St Quintin 'City Market Briefing - Spring 1992' London 1992 p2.

During the 1980's, due to the 'Big Bang' and the deregulation of the City financial markets, a demand for a new type of floor space emerged. The basic format of the City office building was transformed from a 45' wide building with two rows of cellular offices with a corridor down the middle, to a design which included features that the 1960's towers were fundamentally unable to provide. Many large financial and service/professional organizations, in the late 1980's wanted:

Dimensions

- Much larger buildings - increasing from 100,000 sqft to 500,000 sqft,
- Much larger floors - increasing from 4000 sqft to 40,000 sqft
- More electrical and cooling power to cope with 'small power' i.e. concentrations of electronic equipment - increasing from 1.5-2 watts/sqft net to 10 watts/sqft net.
- Column free space and larger grids of 25 sqft to 30 sqft.

Slab to Slab Height

- Increased floor to ceiling heights to accommodate extra cabling and ducting which was used by the new computerized dealing desks. (On average an additional minimum of 2 ft was required for the suspended ceiling to house air conditioning and lighting and 6" for raised floors to manage the power and data cabling.)

Internal Layout

- Flexibility of interior planning with cabled networks comprising grids of suitably located service outlets.
- Additional space at work stations for the computer related equipment of terminals etc.
- More space in the building for machine rooms, cabling closets and ducts, print rooms, storage, training etc.

Services

Accessible vertical ducting for both air and cabling dispersed across the floor plate was also essential.

- Coordinated grids for lighting, ceiling panels, window mullions, air conditioning and floors to allow greater flexibility of space.
- Secure and clean power lines.
- Full VAV air conditioning.

Image

- High profile, more prestigious image.

Advances in information technology led the changes in space requirements and the new 1980's buildings such as at Broadgate and No.1 Finsbury Avenue were, according to Francis Duffy, author of 'The Changing City' on London's office revolution, extensions of the computer. (See

diagram in Appendix A).[6] It was absolutely apparent that the existing supply of office stock could not provide the specifications needed for the new deregulated era.

Therefore it came about that in the late 1980's tenants no longer wanted to occupy the unglamorous, functionally obsolete space. At the same time there was a large influx of new tenants, notably foreign banks into London. Rents grew to world record breaking levels of over £70/sqft, as new tenants fought to get the new trading spaces and higher specification offices. The high rents further accelerated the prices developers would pay for the land.

Suddenly, a new building boom began and the space which had been considered second rate but adequate, now was despised. This shift in thinking happened to coincide with the expiry of many 25 year leases from the early 1960's. In other cases, tenants accepted premium payments from their landlords to leave buildings as owners were anxious to redevelop existing properties. The day of the traditional, narrow floor plated, non air conditioned, small spanned 1960 tower was seen to be over.

At the same time that these vast changes in user requirements and market supply and demand have taken place, there are spectacular, yet little appreciated, shifts occurring which will alter the workplace dramatically, in the long term for many. It is necessary to be aware of the immense improvements in the fields of personnel communication, computing and networking to fully understand how the office environment and work practices may radically change.

The advances in cellular and wireless networks will enable data to be received outside of the office by a portable computer with a receiver. By late 1993 it is predicted[7] that 75% of laptops will have

[6]Duffy F & Henney A The Changing City Bulstrode Press London 1989 p6.
[7]Boudette N & Loudermilk S 'Cellular PC Technology faces obstacles; problems include cost and reliability' PC Week November 1991

receivers built in. There are currently problems with these systems but in Europe and the US Government are dedicating additional radio waves to PC's and data, rather than voice. Once the computers can talk to each other and the networks without cable, either through cellular or radio networks, the flexibility to work both in and out of the office grows. It will be possible to work on the road or from home, where other linkage systems such as ISDN (Integrated Services Digital Network) could travel on top of conventional phone lines, making a home PC 'on-line' to all the networks as it would be in the office. The office itself may minimize or lose its cabling requirements with the installation of structured cabling, fiber optics and perhaps more importantly, infrared signaling. All these changes may result in far less heat being created, thus reducing the need for air conditioning in many part of the office environment[8]. Others would argue that more equipment will be used[9] and so the heat levels produced will remain constant but that air handling systems should be localized, in any case. The decentralization of the office in terms of where people work and the services they are provided with (networks, back offices, controllable air handling) will be a constant theme in the next decade.

However, the recession of the 1990's has hit London and in particular, the City hard. 20% surplus capacity has put many property companies into receivership, rents have fallen to the point where some developments such as CanonGate (Speyhawk) are reported to be available to tenants occupying at virtually no rent, just to avoid the rating (property tax) liabilities. Other City center and fringe schemes (and especially those in the Docklands) may be unable to find tenants at all in the foreseeable future. Banks now have the liability for many of their own worst loans and the ability to call many others in. The property companies who purchased redevelopment sites at the

[8]For Example, Paul Robathan of the Intelligent Building Group argues that less air conditioning will be required due to the use of battery powered computers in the office. See Chapter 2 for further information.

[9]For Example, Andrew Bud of Olivettis' cellular telephone team argues some users will be needing more and not less power in the office as more powerful machines are used (work stations). He adds, however, that PC's will use less power and therefore it depends what level of computer is being used.

height of the market in the late 1980's are now unlikely to obtain funding to rebuild and would experience great difficulty in obtaining a tenant even if they did.

The long lead time for major City developments means that owners have to start the process of obtaining vacant possession of a building some time before it is actually required, so as to give the tenants the statutory notice periods. When the markets became so tough in the City that there was no question of redevelopment, there were several major 1960's properties where the tenants had already begun to move out of the building, or having been denied new leases, had made commitments to go elsewhere. Therefore, when decisions were make not to go ahead with redevelopment, the buildings were already vacant and the owners had to decide what to do with the non-income producing liability it now held, rather than develop a profitable new building.

1.1 Hypothesis

The question that needs to be answered is, how do the owners deal with these obsolete, mainly vacant white elephants, which have a considerable on-going tax liability. Should they attempt to redevelop, mothball, demolish, try to lease in their current condition, find an alternative use or carry out refurbishment at some level. Are the buildings too obsolete to be occupied at all? Should they just be demolished and rebuilt as 'state of the art' offices such as have been designed for the sites as soon as the market permits?

A basic hypothesis would seem to be that there is no hope of reusing these properties in their current form due to various forms of obsolescence and depreciation, following the technological advances in the 1980's and the subsequent more, sophisticated requirements of the buildings to house the computers requirements.

Once the repercussions of all the technology changes are understood, along with a fundamental understanding of how work is likely to change in the next decade and the type of environments that

will be sought, it is likely that there will be important impacts on the work place. Will these changes in any way affect the obsolescence of the typical 1960's City office block which became unwanted in the 1980's? The methodology that was employed to find an answer to this question was first to carry out the case studies, followed by an exploration of the issues raised and finally an analysis of the whole problem.

An overview of the relevant literature on obsolescence is laid out in Chapter 2 as well as a background to the planning and development of the City. Specific mention is made of London Wall, the street on which the three case studies for this thesis are located. General descriptions are also given of 1960's buildings along with their problems and limitations. The spatial impact of technical advances and changes in work are discussed in Chapter 3. Chapter 4 contains a discussion on the types of buildings that occupiers, especially in Europe, will be looking for including a new emphasis on intelligence, energy saving and green concepts. The potential impacts of new legislation concerning buildings and workforce conditions is also discussed in this chapter. Moor House and Winchester House, on London Wall, London EC2 are examples of 1960's buildings that were scheduled to be demolished and redeveloped but currently will not be. Along with a third building on the same street, City Tower, they will be the case study subjects in Chapter 5. The concluding chapter summarizes the changes that are perceived to be going to occur in the field, along with the issues for further research.

CHAPTER 2

OBSOLESCENCE AND 1960'S TOWERS

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2.1 Obsolescence

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2.3 History of 1960's Office Towers

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CHAPTER 2

OBSOLESCENCE AND 1960'S OFFICE TOWERS

2.0 Introduction

This chapter first includes a short discussion of some of the current UK literature on obsolescence and a means of analysis to see what features contribute most to a building becoming obsolescent. The UK literature and research is used as it can be most obviously applied to UK buildings whilst it also encompasses much of what is written, and is also relevant in the US. The chapter then goes on to discuss the history of the development of the 1960's office blocks and of London Wall in particular. There is also a detailed description of the features of typical 1960's buildings and why they became viewed as obsolete and unable to provide for the office market in the 1980's. Especially important was the poor level of internal flexibility, where the internal partitions were often of brick or systems that were equally inflexible. Finally, leasing patterns are discussed with an explanation of why in the UK building services are obsolete by the end of a term and what impact this has on building obsolescence. The chapters' conclusion summarizes the problems with 1960's office towers.

2.1 Obsolescence

The questions in this thesis include a discussion as to whether three particular buildings located on London Wall have become obsolete. Therefore, it is necessary to have an idea as to what obsolescence means, how it can be measured and what criteria are currently used to define it. Included is a discussion of some of the most current literature on the subject. Andrew Baum, a leading quantitative property economist and researcher in the UK describes what features he has identified as being most important in identifying obsolescence in the City of London office stock and why they vary from the commonly held theory that age is the most important factor.

Baums' work[10] tests the hypothesis that a model which classifies the causes of depreciation gives better explanations of depreciation than one which relates depreciation to the age of the building alone. He tests this thesis in the City of London and uses estimates of rental value, yield and capital value against age and quantitative estimates of building quality. The definitions that will be used in this paper are by Baum and are as follows:

Depreciation

> **"Depreciation** is a loss in the value of a property investment. Because depreciation is a problem even in times of increasing values, it should be more fully defined as a loss in the real value of a property investment. Because the grant of valuable planning permissions can disguise depreciation, a complete definition for this research is a **loss in the real existing use value of a property investment."**

Obsolescence

> **"Obsolescence,** on the other hand, is one of the causes of depreciation. It is a **decline in the utility not directly related to physical usage or the passage of time**. By contrast, other causes of building depreciation - physical deterioration being the main one - fall outside the definition of obsolescence. Obsolescence results from changes which are extraneous to the building " A Baum[11]

Baum goes onto say that there are three main qualities of a building which are differently affected by physical depreciation and building obsolescence as the joint causes of building depreciation. These are the external appearance, which suffers from both; the internal specification, which suffers from both; and the configuration of the building which can suffer only from obsolescence. These discussions are useful here because they shows how, in the future, a buildings' obsolescence may be able to be predicted and hence prevented.

Baum concludes that obsolescence is the most important source of depreciation and of the three obsolescence factors, internal specification and configuration are most important in rental depreciation. Layout is the most important factor within configuration and floor to ceiling height is less important than expected. Services are four times as important as internal finishes. The

[10]Baum A E Property Investment Depreciation and Obsolescence Routledge London 1991.
[11]Baum A E Property Investment Depreciation and Obsolescence Routledge London 1991 p187.

prediction of depreciation depends on the prediction of the future incidence of these three sources of obsolescence. However, the nature of obsolescence is that it is not predictable. Therefore buildings will be preferred if they are flexible. Flexibility reduces the risk of an irreversible and major reduction in value.

There are many different groups of attributes affecting the level of building obsolescence:

- Flexibility of the buildings to accommodate alterations in the use of space. (CALUS and Wootton)
- Flexibility of a building to accommodate improved information technology and engineering services. (Duffy, Pepper and Baum)[12]
- Appearance of a building. (Hough and Kratz, Vandell and Lane, Baum)[13]
- Age of a building. (Traditional)

Ghani Khalid, a researcher at the College of Estate Management, Reading, England has developed a hedonic pricing model, which if applied to the London market, could show what features cause a building to become obsolete and how the lessons learnt may be applied to the next generation of office buildings. (See Appendix B for an explanation of Khalids' hedonic methodology)

> "Various studies of building obsolescence-e.g. CALUS (1986), Jones Lang Wootton (1987), and Baum (1989)[14] have shown that uncertainty in predicting the financial impact of obsolescence has resulted in many commercial office buildings reaching the end of their

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[12]Duffy F 'The City Revolution - Its Impact on Office Space' in The Workplace Revolution Healey and Baker London 1986

Pepper D & Morgan T 'The Key to Successful Office Planning' Investors Chronicle November 7 1986 p32.

Baum A E An Analysis of Property Investment Depreciation and Obsolescence Ph. D Thesis University of Reading 1989.

[13]Hough D E & Kratz C G Can 'Good' Architecture Meet the Market Test? Journal of Urban Economics 14:40-54. 1983.

Vandell K D & Lane J S The Economics of Architecture and Urban Design: Some preliminary Findings Unpublished paper 1989.

Baum A E An Analysis of Property Investment Depreciation and Obsolescence Ph.D Thesis University of Reading 1989.

[14]CALUS Depreciation of commercial property Center of Advanced Land Use Studies (CALUS) College of Estate Management Reading 1986.

Jones Lang Wotton 'Obsolescence: Its Impact on Property Performance' Jones Lang Wootton London 1987.

Baum A E An Analysis of Property Investment Depreciation and Obsolescence Ph. D Thesis, University of Reading 1989.

> economic life earlier than expected. If the financial impacts caused by the attributes of obsolescence are analyzed, predicted and prioritized during the design and cost planning stage of a building then impact can be minimized, which would prolong its' economic life." G Khalid[15]

Khalids' findings show that in Kuala Lumpur, at least, the main impact of obsolescence is due to appearance, followed by flexibility and quality of services. This emphasis on appearance ties in with the growing awareness by tenants of the need to have a well defined and positive image for their companies. This seems to be one of the major problems with the 1960's blocks in London and it is interesting that this concern crosses international boundaries.

Other discussions of obsolescence include conversations with Gerry Blundel, head of research at Jones Lang Wootton. Blundel states that the problem with tower buildings is that they are less flexible than traditional 'groundscrapers' and are accordingly less adaptable. He quotes the example of a block of property on the south side of Bedford Square, London W1 (five Georgian houses knocked into one to provide approximately 40,000 sqft which Abbey Life, a UK Life Assurance fund have recently refurbished.) Extensions onto the rear of the property at several levels were made as well as linkages through individual properties at different levels. These could all be re-configured at some time in the future if the user changes size or working patterns.

It will be interesting to see whether, when compared to a 1960's tower, or even the new tower at Canary Wharf, if some older buildings become less obsolete than newer ones. It could be that there are very limited possibilities of adapting a floor plate in a high rise block, whereas an older 'groundscraper' can be altered. However, the appeal of traditional or less conventional buildings may just be a sign of what the 1990's tenant wants as a passing trend. This paper will attempt to look at some of these issues.

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[15]Khalid G 'Hedonic Price Estimation of the Financial Impact of Obsolescence in Commercial Office Buildings' Department of Construction Management & Engineering University of Reading 1992 pp 1-2.

There is much written on the theory of obsolescence but it is important to also look at real examples. The case studies in this paper were studied with regard to their layout and configurations to see whether they are obsolete or not. Once a basic floor plan is available for analysis it is then possible to see whether or not the space will be obsolete once changes in outside variables, such as technology and offices practices are made. This is the real purpose of this paper.

2.2 Brief Background to Postwar Planning in the City of London

The modern development of the City as an international banking center originated in the 1950's with the start of the Eurodollar market. The destruction of about a third of the City during the 2nd World War set the scene for large scale postwar redevelopment. There have been three phases to post-war planning in the City: Comprehensive redevelopment, piecemeal planning and conservation and the most recent which was *laissez-faire*. The first two types failed, with the large scale attempts at comprehensive planning; at London Wall, Paternoster and the Barbican by the City Corporation and the London County Council (the planning body for the City). The towers on London Wall are the subject of the case studies in this paper and will be described more fully further on.

> "Such schemes can be traced back to Le Corbusier's views about cities set out in *La Ville Radieuse* and in various radical plans for Paris and other cities. These plans rejected traditional streets, which allow movement not only for people and vehicles, but also frontages for shops and access to offices, restaurants and other buildings. Instead traffic, people and buildings were to be segregated. Le Corbusier's thinking fails most obviously in London Wall, with its incomplete and little used walkways and succeeds neither in the dismal spaces around St. Paul's nor in the Barbican." F Duffy[16]

[16]Duffy F & Henney A The Changing City Bulstrode Press London 1989 p78.

From the late 1960's, comprehensive planning was seen to have failed so badly that piecemeal planning became the norm again. The City moved back to its pre-war thinking and the developers revelled in the fact that the planning system helped them by controlling the supply of new buildings and diminished their risks. The poor quality of many of the new buildings reflected the short term commercial values of the opportunistic developers.

> "This was the golden age of developers, who found that the planning system make their tasks simpler by controlling the supply of new buildings and thus diminishing their risks. Office schemes were often opportunistic attempts to build too much on too small sites; many were poorly designed and cheaply constructed; and most were indifferent to both settings and users' requirements" F Duffy[17]

The 1960's speculative office towers at London Wall were all classic examples of 1960 entrepreneurial developments and many fit Duffys' description well. It was not surprising that in the 1970's the City Corporation concentrated on conservation following the rejection of modern architecture and eventually produced an obsolete City Plan in 1984 which did not correctly forecast the technological and financial changes of the 1980's. Fundamental shifts in the UK economy and financial sectors occurred during the run-up to 'Big Bang' starting with the Thatcher era in 1979 and the abolition of exchange controls. Since 1983 the deregulation of the financial sector and demand for large amounts of high quality office space led to the vast redevelopments in the City. Previously, many tenants had occupied numerous smaller buildings and suddenly with the expansion of the financial markets and the introduction of complex technology, all needed to be located under one large roof.

This third phase of City planning was a reaction to 'Big Bang', and the City, in a desperate attempt to compete with outlying areas, encouraged such enormous redevelopments that it is impossible to believe any real understanding or concern with anything other than economics has allowed many of the schemes to be approved. The large scale of development was fueled by the new fast track

[17]Duffy F & Henney A The Changing City Bulstrode Press London 1989 p79.

construction techniques evolved in the US and transferred to the UK by owners and construction managers brought over to build the vast schemes at Broadgate, London Bridge City and elsewhere.

London became the center of an extraordinary boom with the supply of new stock expanding 50% in the eight years to 1993. Furthermore, as the City grew in size, the geographic core expanded and addresses that previously were on the fringe of the City became acceptable. Thus, for example, the speculative 1960's office towers on London Wall were seen as prime redevelopment sites by the late 1980's. The property company landlords (for the main) began to joint venture with the funding institutions. Together they planned major schemes to take advantage of the City planners panic about business leaving the City for the newly fashionable and cheaper Docklands, Midtown areas and the West End.

In this paper there is a clear difference between 'demolition and rebuilding' and 'renovating and repositioning'. The former refers to the process of building a completely new building on a site of an old property. The latter can refer to a refurbishment, renovation, repositioning or recycling process carried out on an existing and still standing building. This group of words is often used interchangably.

In this way, some of the buildings on London Wall were redeveloped (Lee House became the new Alban Gate by MEPC and the vast Little Britain scheme at the top of London Wall replaced a variety of older properties.) Other sites were prepared for redevelopment, with the long processes of obtaining planning permissions and other building approvals, as well as funding, full design and vacant possession. Examples here were the projects at Moor House (Greycoat and Scottish Amicable Life Assurance Fund) and Winchester House (Wates City and Friends Provident Life Assurance Fund).

An alternative model which was carried out in 1984 was the complete refurbishment of another of the still standing 1960's towers, 40 Basinghall Street, now known as City Tower. This was so successful that the highest rent ever achieved in the City was in this building. The highest rents came at a time of great shortage of space (1987/1988) as many of the now completed schemes were still in the pipeline, but proved how 1960's space could be utilized and fully let.

However, the collapse of the world stock markets in October 1987 signaled the beginning of the end of the London property boom, although new speculative construction starts still continued, albeit at very much lower levels, dropping to 50,000 sqft in the fourth quarter of 1991[18]. Securities trading dropped, too many international banks were competing for business and many made terrible property loans which had fueled the boom and expansion of the London office market. The more new property that came on the market, the less desirable became the old towers. This also was the same pattern that had occurred in many US cities.

The City planning authority is now reconsidering what its direction for the next decades should be. There is an argument that a new planning body should be incorporated for the whole of London, but that is a debate that will occur for some time to come. Meanwhile it is fair to say that there will be very few schemes going ahead in the short to medium term.

2.3 History of 1960's office development on London Wall.

By 1954, London Wartime Building licenses were dropped and there was no further control for the time being on building materials being available for development, other than planning regulations and building code. (The latter were concerned with health and safety issues in the workplace). Demand for offices was strong in London in the late 1950's, due to the war time bombings in the

[18]Jones Lang Wootton 'The City Office Quarterly Review - First Quarter 1992' 1992 p3.

center of the City, the increase in headquarters functions in the Capital and the growth of London as an international City.

The financing of the property boom that occurred at this time was largely achieved by individual developers incorporating as property companies, with the majority of shares owned by the families of the developer. Property company shares rose in value from £103 million in 1958 to £800 million four years later. The income tax advantages of incorporation were substantial and as no capital gains tax existed until 1962, the shareholders made fortunes. Much development took place in the immediate post war era[19] with the total inventory increasing substantially:

Year	Total Inventory	
1939	87	million sqft
1945	77	"
1962	115	"
1966	140	"

Many of the British post war developers were labeled as speculators and their credibility was not helped by the few who frequently appeared in the press. The conditions of the growing number of London office workers were greatly improved by the new office boom, but at the same time the quality of the buildings themselves were heavily criticized. The new breed of commercial developers and their vast profits were censured, according to Marriot.

> "With office buildings, the developers' profit margins were to a large extent increased as a direct result of successive Governments' policies, which restricted supply during the war and the early post-war years, unleashed it in the mid-fifties and then clamped down tighter and tighter in the sixties. As supply was held back, rents raced onwards in response to demand. George Brown's ban on more offices in London in November 1964 was the crowning gift to the developers. By then supply had caught up with demand and there appeared to be a slight surplus of office blocks." O Marriot[20]

[19]Marriot O The Property Boom Hamish Hamilton 1967 pp 66-79.
[20]Marriot O The Property Boom Hamish Hamilton 1967 p11.

The UK tax laws worked well in the favor of the developers and property development, provided the end product was not sold, became a paradise for tax-free profit. Men such as Harry Hyams, Jack Cotton, Maurice Wohl and Charles Clore had 'never had it so good.'[21]

The Barbican, the heavily bombed old rag trade area to the north of the City (See plan in Appendix C), was one of the few truly planned areas of post war development. The residential zone for over 6000 occupants has been heavily criticized for its concrete bareness, but residents have few complaints. The late 1970's Barbican Arts Center, home to the London Philharmonic and the Royal Shakespeare Company, was hailed as a concrete monster by some, but others admire it. The Commercial zone of 28 acres is based around what is now known as London Wall and previously was called 'Route 11'. Six 18 story office blocks were built on London Wall, which was always considered a questionable piece of urban planning. It is a six lane highway which still goes from 'no-where to no-where very much' (Aldersgate to Moorgate) Originally planned as a northern by-pass to the City, it was never completed. (See plan in Appendix C).

The City Corporation paid £4 million for the commercial land, and as was the way in the late 1950's, approved a very specific design for the towers, such that the developers' architects had no leeway for change. The land was then offered, by tender for the highest bidder, to developers, on long leases. Moor House and Lee House (now demolished to make way for Alban Gate, an unlet, 1990's 500,000 sqft block straddling London Wall) were the first two sites to be put out to tender. Charles Clore was the winner of the twelve tenderers in 1957, although only three developers bid for Lee House later the same year, with Joe Gold winning the bid and leasing to a syndicate.

Between 1957 and 1960 commercial rents in London increased from £1.25 to £1.75 per sqft. They further increased to £3.25 per sqft by the time 40 Basinghall St. (now known as City Tower) was

[21]Macmillan's 1959 election slogan "We've never had it so good"

let in 1961. The syndicate which sublet Lee House (named after President Kennedy's' sister-in-law, one of the syndicators' wife), made a profit of £1.8 million by the time the building was let. St. Alphage House was developed by Maurice Wingate, Royex House by Harry Hyams at the Oldham Estate with Wimpey and 40 Basinghall Street by the Phoenix Assurance and Wates. As an example of how fast land values were moving, the ground lease for the land at Royex House in 1959 was £0.57 per sqft, and at 40 Basinghall Street it was £0.75 in 1960. Rents were moving fast too, as mentioned Wates leased their whole tower to IBM for £3.25 per sqft, double the rents achieved in Moor House only a year earlier.

Moor House and 40 Basinghall Street are two of the case studies analyzed in this paper and Winchester House, another property of the same period, further up London Wall is a third. This latter property was originally developed as two separate buildings but when the developer of one went bankrupt, the two sites were incorporated by St. Martins Property Group and a bridge building was built between them. The table over sets out the rents and profits made by the developers of five of the big blocks on London Wall[22] :

[22]Marriot O The Property Boom Hamish Hamilton 1967 p72.

Table to show land and occupational rents for the London Wall developments.

Building Name and Date Head lease agreed.	Rents to City Corporation per lettable sqft	Developers	Office Rents received by developers and date of letting	Capital profits including profit rentals
Moor House. 1959	£0.32	Charles Clore	£1.00 1960	£1.4 million
St.Alphage House. 1959	£0.25	Glover/Westbrook/McAlpine/Wingate	£1.55 1960	£2.5 million
Lee House. 1960	£0.40	Roses/Fenston/ Gold/Radziwill	£1.75 1962	£2.6 million
Royex House 1960.	£0.55	Hyams/Wimpey	£3.00 1961	£2.9 million
40 Basinghall Street. 1960	£0.75	Wates/Phoenix	£3.25 1961	£2.7 million

2.4 Specification

Many of the speculative offices of the 1960's were similar in type, especially those on London Wall, which were specified by the City planners and put up as fast as possible by developers who wished to commence their cash flows. (The exception here was Harry Hyams who was the master of keeping buildings empty to catch further rent rises and to avoid paying property taxes on partially tenanted buildings.)

Common features included:

Dimensions

- Building length of approximately 100 ft-150 ft.
- Building width of approximately 45 feet, depending on span, known as wall to wall depth.

Internal Layout

- Inflexible partition systems did not allow for easy rearrangement of office space.
- Core with offices laid out on either side. The corridor was often predetermined by rows of columns. This allows individual users access to direct daylight (20 ft is as deep as can be lit by natural light with a 5 ft corridor between offices on either side of the building.)
- The service cores were not always in the same place. Sometimes they were at one end, against a side wall or in the center. All needed to have a second means of egress staircase. The regulations which dictated the placing of this were often obsolete and had not been rewritten for new tower buildings.
- Structural spans of 16' with columns every 16'.

- Internal fitting-out grid of 4 ft (1.2m) which was envisaged at the time to be the standard size for components and materials.

Cladding / Windows

- Glazed curtain walling with clear glass.
- Floor sizes of between 4,000-6,000 sqft net lettable.
- Opening windows.

Common Parts

- Single level entrance lobbies and low key external entrances.

Slab to Slab height

- Solid Slab floors and minimal suspended ceilings for recessed light fittings only.
- No raised floors
- Floor to Ceiling heights of 9'6"-10'.
- Floor loadings of 50-80 lb/sqft dead load and 20 lb/sqft live load.
- London towers were only as tall as 15-20 stories and totaled between 50,000-100,000 sqft.

Services

- Many were poorly serviced with low quality elevators and low capacity, crudely controlled air conditioning systems (if any at all.)
- Some incorporated air handling systems and others did not. Many tenants installed a modified system on a floor by floor basis.
- Centrally controlled central heating systems.
- Non sprinklered space.
- Male and female bathrooms on every floor.
- Poor energy efficiency and high wastage and costs.

There were many structural problems with these buildings and these are referred to, in section 2.6B summarizing the problems with structures.

2.5 Leasing patterns

The traditional form of leasing in the United Kingdom, certainly through the 1960's, 1970's and 1980's was the standard 'institutional' 25 year lease. At the start of the term the tenant would sign an obligation to pay the agreed rent (usually the open market rent, with perhaps a very small allowance for a rent free period or a fitting out cost) which would then be subject to rent reviews at the end of every five year period. The rent would be reviewed, by a set process which could involve arbitration or an independent expert, if necessary. Most rents were settled by negotiation.

The rent review was almost without exception an upward only review, so that the landlords' worst position would be no increase. The review was also usually to open market value and on the assumption the property was in the condition it was in when the tenant took occupation. Thus, if

the rental market had improved during the intervening five year period and the negotiations were carried out adequately, the landlord was assured of an increased rent, with the security of knowing it would continue to rise for the remainder of the term.

This form of lease was developed to encourage the financing of the developments, since the guaranteed minimum income from the long lease enabled the developer to borrow further, provided the covenant of the tenant was good enough. The pension fund and life assurance financing institutions, which begun to play a major part in UK property development in the 1960's and onwards also demanded the guaranteed income stream that the twenty five year lease provided. In addition, the tenant had the security of knowing he could stay in the property and not be forced out or coerced into paying a higher than market rent for security of tenure. In a landlords' market there was never any problem and when times were bad in the real estate world, landlords preferred to drop rents rather than give up the long lease term. Tenants would sometimes get concessions which meant their rents were only reviewed to a percentage of the open market value, but because the funding institutions were so concerned to secure their real estate investment cash flows they would not allow their long leases to be dented.

2.6 Tenants

The tenants who occupied the towers on London Wall in the years up to the major expansion (in the 1960's) of London were a mixture of financial, professional and commercial. For example, IBM occupied the tower at 40 Basinghall Street and solicitors Cameron Markby had space in Moor House on a number of floors. Other major tenants included the Japanese Bank, Daiwa. London Wall was never the core of the City but was near enough to the Bank and Cheapside to house those organizations who needed to be close enough to serve key City players. The location had the advantages of being within the City but without the expense that the very center entailed.

2.7 Summary of Problems with 1960's Buildings and an Explanation of why they are Perceived as Obsolete.

A) Specification

> "In design terms, many of these modest rental slabs, constructed during the 1950's and 1960's, paid lip service to the Modern Movement and British Brutalism, with expressed concrete structures, glazed curtain wall facades and functional planning. They were planned around central service cores or configured around the shape of the letters I, H, E or L. In general these buildings were characterized by small entrance halls, cheap materials and mean detailing, and tried to maximize the development potential of a site by piling up as many floors as the planning regulations would allow." S Harris[23]

> "The form became ingrained in property lore as the funding institutions' preferred depth, despite the fact that the resulting shape of the office rooms was inefficient. Unless the window module is wide and the central part of the building can be used to accommodate secretaries and ancillary requirements, such rooms tend to be long, narrow and wasteful of space." F Duffy[24]

By the late 1970's problems with the specifications of the 1960's towers included[25]:

Dimensions

- Inadequate floor to ceiling heights to encompass the air conditioning units that were wanted by many occupiers to control excess heat gain by the heat-generating computer machinery in offices. The creation of the second void (i.e. for a suspended ceiling) began in the 1970's.
- The move towards larger floor areas (which eventually reached 40,000 sqft column free dealing floors in some developments) provided the bigger tenants with the enhanced trading facilities they needed to participate in the 'Big Bang' deregulation of the financial markets. The old 1960's towers were unable to compete for this type of tenant.
- Very small floor plates creating inefficiencies for larger organizations who spread over many levels.
- Metric European specifications meant that floor, ceiling and office furniture all failed to fit the old 4' grid patterns. (However, there is some question as to whether the system ever worked on a 4' grid with regard to fitting out.)

Internal Layout

- The typical central corridor layout was inefficient and unimaginative.
- No provision for handicap access.
- Inflexible partitioning systems.

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[23]Harris S 'The Ever Evolving office box' City Changes Ed. Burdett R The Architectural Foundation London 1992 p13.

[24]Duffy F The Changing City Bulstrode Press London 1989.

[25]Harris S 'The Ever Evolving office box' City Changes Ed Burdett R The Architectural Foundation London 1992 pp13-16.

Cladding / Windows

- Solar gain caused uncontrollable heat in the summer.

Slab to Slab height

- Solid Slab office floors meant all power and communication cables had to run from power points along the perimeter of the building to individual desk positions. As office floors became larger and more computer equipment was utilized it became necessary to set ducts into the concrete slabs and this limited cable distribution and flexibility of layout. In addition, the 1960's towers had inadequate floor to ceiling heights to encompass the raised accessible floors that became a common feature of 1980's offices.

Services

- No centrally controllable central heating.
- No air conditioning.

> "Thus in a matter of less than twenty years, the office buildings of the 1960's had become obsolete and could no longer provide an acceptable office environment to the modern business community." S Harris[26]

B) Structure

The structural problems with UK towers have traditionally included high alumina cement, asbestos, cladding problems and the inadequate size and specification of the internal services. The asbestos problems, were mainly due to the fitting out and internal finishes and not major fire proofing as in the US, because the buildings are concrete, and not steel framed. Therefore, whilst abatement is a concern and any damaged or dangerous asbestos has to be entirely stripped out, there is far less of it than in contemporary US and some can be left, if undisturbed.

Water penetration behind the cladding is a potential problem, and many of the buildings of the period had leaks at some levels. However, the danger only really starts when the bolts and structural systems are corroded behind the facade. In some instances it becomes necessary to reclad the buildings but many of the original facades on buildings of this era are waterproof.

There were several main problems with the construction process which led to structural problems with office towers during this period[27]. They can be summarized as follows:

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[26]Harris S 'The Ever Evolving Office Box' City Changes Ed Burdett R The Architectural Foundation London 1992 p.14.

1. Problematic interfaces due to different technologies

   Prefabricated components were being used for the first time and they were being mixed in with traditional construction methods (all on the same site). The interfaces between the prefabricated components and those cast on site were difficult. The architect often did not know or take into account the different degrees of accuracy, for say, shrinkage that the new methods would create.

2. UK architects had no previous experience in high rise construction

   The traditional UK system meant that the contractor followed the architects' specification exactly and as the architect had no experience in high rise or in using new prefab technology, errors were made. In addition the architects sometimes were unaware of up to date construction processes but the contractor would not use his initiative and instead followed the architects' instructions.

3. Cheap materials and methods of construction

   The depreciation that the landlords could obtain for the buildings was only over 30 years and so they became anxious to save monies on construction costs wherever possible.

C) Aesthetics

> "There has been no shortage of disasters. Much that went up in the 1950's and 1960's deliberately disregarded the pattern and character of the surrounding streets." M Girouard.[28]

> "With hindsight, it seems that planners, developers and architects cared little for what the buildings looked like and had even less consideration for their longevity." S Harris.[29]

Problems with the aesthetics included the fact that on the exterior, many of the buildings were drab and unimaginative, with poor detailing and finishes. In addition, the failure of the elevated City walkway to either be accepted or be completed, and the separation of traffic, people and buildings gave rise to a new form of streetscape but one which was quickly rejected by those who had to occupy the area. Overall, aesthetically the new buildings of the 1960's were soon disliked for their monotonous architecture and poor relationship to the street and movement of the people who used them. The fear of the concrete jungle was real with limited green space and sickly landscaping

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[27]Petroforte R Methodological Considerations for the Improvement of Dimensional Tolerance in Construction. Massachusetts Institute of Technology Department of Civil Engineering MSc (1987).

[28]Girouard M 'City Changes - Architecture in the City of London 1985-1995' Guide to the Exhibition The Architecture Foundation London 1992.

[29]Harris S 'The Ever Evolving office box' City Changes Ed. Burdett R The Architecture Foundation London 1992 .

(trees) The scale was thought to be wrong but in retrospect this may not be the case, when compared to the more inappropriately scaled developments of the 1980's.

D) Image

The 1980's were a period in the UK where the concept of 'design' became important (known as the 'Conran' effect after the leading UK designer, Terance Conran) and a growing awareness of the importance of the quality of the environment extended from the design of furniture to architecture.

> "Overnight, attention was paid to tenants' egos. A crucial question for the tenant was 'How do my customers see me? Skyline identity, street credibility and the quality of common areas, the lobbies, lift cores and entrances became material considerations.....by the mid eighties." S Harris[30]

The 1960's buildings on London Wall were unable to fulfill a design criteria for any tenant that was concerned about such things.

E) 25 Year Leases

In hindsight, the twenty five year lease as described above was a mixed benefit for the landlord. It is now estimated that mechanical services need a complete overhaul and usually replacement every 15 years[31]. Therefore, if the landlord has no obligations to maintain the building during a 25 year period, no capital investments will be made. The value of the building will be diminished at the end of the period because the financial input necessary at that stage to bring it up to standard will be a huge burden on the landlord. At the end of the lease period the landlord has to make major decisions regarding investment into new services, which if capital had been put into the building earlier may not be necessary, at such a large scale.

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[30]Harris S 'The Ever Evolving Office Box' City Changes Ed. Burdett R The Architectural Foundation London 1992 pp 14-15.

[31]15 year replacement theory from discussions with Robin Broadhurst and Norman Bowie of Jones Lang Wootton, London and The Changing City by F Duffy, Bulstrode Press, 1989.

As many of the services were obsolete and had reached the end of their usable lives in these buildings by the time the leases expired in the mid to late 1980's, many tenants preferred to relocate, and so made temporary arrangements to stay until they found alternative accommodation. Others realized that the buildings would be wanted for redevelopment and so used the right to renew their leases to enhance their negotiating positions. For the landlord to avoid issuing new 25 year leases he needs to be able to prove that he is ready to go ahead with redevelopment. The landlord is left in a poor position at this stage - his building is no longer good enough to receive a market rent, due to obsolescence and worn out services, let alone due to the shifts in the market requirements, and at the same time he has to decide whether to redevelop or not.

2.8 Conclusion.

By the mid 1980's, larger buildings were favored by the developers as building efficiency could be maximized. This came from using a greater window-to-window depth which created more internal space in relation to the expensive facade, and gave the developer a higher residual land value. Space planning, a new discipline in the UK in the 1980's, allowed greater flexibility and efficiency for the layouts of both open plan and cellular offices in the new developments.

The sites in the center of the city were tightly developed and restricted by conservation zones and so fringe areas were drawn into an extended central zone to accommodate the new larger buildings. Good buildings in design terms were found to let faster and to yield higher rents. The financial connection between percentage yield, rental value, construction cost and site value made it a suitable climate for speculative development in commercial property. Money was easy to borrow, demand for office space was high and a significant amount of speculative development took place.

The 1960's buildings were thought to be unable to adapt to the new specifications required by increasingly sophisticated tenants, in either the short term (for company reorganization), in the medium term for change of use (for change from office to dealing floor and back again), or the long

term (for more plant and equipment (5-7 years) or to replace major plant (15 years.) It was under these circumstances that the 1960's towers on London wall became to be seen as obsolescent and in need of redevelopment.

> "Apart from the Barbican, the main urban design contributions of the post-war era were the office towers of London Wall, a corporate anonymity unlikely to survive the next decade." P Finch[32]

> "Some of Britain's most established architects including Sir Norman Foster, Sir Richard Rogers and Terry Farrell (author of the completed Alban Gate) are responsible for new buildings along the entire length of this unloved street (London Wall) which may become a model for urban development in the City." R Burdett[33]

However, the recession of the early 1990's, the 20% vacancy in the City of London and the lack of available financing for major building projects has led to the postponement of the projects at No. 1 London Wall (Foster), Daiwa Europe House (Rogers) and Moor House (Farrell). All these buildings were considered absolutely obsolete by the mid 1980's and this thesis will examine if this is still the case in mid 1992.

[32]Finch P 'Towards an Urban Architecture' City Changes Ed. Burdett R The Architecture Foundation London 1992 p17.

[33]Burdett R 'Urban Redevelopments' City Changes The Architecture Foundation London 1992 p32.

CHAPTER 3

INNOVATIONS IN OFFICE INFORMATION TECHNOLOGY AND CHANGES IN WORK PRACTICES.

CHAPTER 3

INNOVATIONS IN OFFICE INFORMATION TECHNOLOGY AND CHANGES IN WORK PRACTICES.

3.0 Introduction

This chapter will discuss how the new and ever faster innovations and improvements in information technology will lead to great changes in our work practices. At the same time, changes in the cultures of organization, downsizing of workforces and new forms of management will ensure that office space is used very differently. When the two are put together, it will be seen that an altered space requirement will exist. Space that was previously considered unsuitable for corporate, professional and other users may take on a new life once the new technology and office practices are introduced in the 1990's.

The current growth of networks, cellular communications, and fiber-optic cables are forming the basis for a common information community spanning the globe. The use of new computerized electronic services such as telecommuting, teleconferencing, electronic education and electronic shopping will change the way we live and work. At the same time there is a continued need for strategic face-to-face meetings and discussions for many workers in the same company and with clients and competitors.

A knowledge-based social order is now evolving in which homes, offices, schools and communities become interwoven into a web of intelligent communication services offering unparalleled opportunities for accelerating scientific progress, economic development, education and other revolutionary changes.[34] This is reflected in the new types of organizational structures that will

[34]Halal W 'The Information Technology Revolution' *The Futurist* July/August 1992.

dominate the workplaces for the next decades. When all these changes are linked with the issues currently being faced in the building industry, especially in Europe, even greater changes are perceivable.

3.1 Technology

There are several broad trends of technology change and they are as follows:

Portable Communications Technology

PC's, Portable Computers and new 'intelligent' systems

The portable PC will soon be linked to the world's computers (via the networks), fax, telephone and home systems, even when out of the office. Thus, when in the office, being carried around or at home the same ease of communication and information is available

The pocket book, laptop, palmtop and new hand writing tablet computers will be used by many workers who currently use terminals and whilst some larger permanent screens will still be in use, the quality of the portable will improve vastly. The laptops, by late 1992 will have as high quality resolution and screens as the desk tops today, which will cut down on the need to have machines at home and at work. The weight of a 486 SX portable is now just down to a few pounds and will carry on dropping throughout the 1990's, as will the Apple technology.

The Apple and PC systems will continue to further integrate which will provide many more communication advantages, especially when networking within a single office system. For example, it will be possible for diary systems to arrange for as many participants as required in a meeting to get together with the date fixed by the automatic diary process. In addition, the booking system for the conference room will also be activated. In addition, the information will be able to transfer to the individual wireless hand held organizers of the participants, keeping them fully up to date and no doubt flagging the new entry into the system. The repercussions on the secretarial and

support staff numbers and quality could be enormous. Prices will also drop from several thousand dollars to several hundred in the next five years.

The portable computer will operate on batteries (see below) and will be rechargeable at night in a central office area or by plugging directly into the mains to take advantage of cheap night-time electricity. This will aid the utility companies by using a steady stream of electricity and should enable money to be saved by the users.

Software advances will also help change the office environment with the intelligent systems that are becoming available. Functions of 'knowledge assistant' or 'slave' will be available to be stored in an individual's PC. The system will be able to learn over time the way each 'master' works and may be able to respond to routine inquiries, tasks etc. Apple is planning to introduce a 'personal digital assistant' by 1993.

In addition to the vast changes in the technology available, the cost of the PC is falling so fast that this fact alone will impact the way work occurs. See Appendix D for the graph showing 'startling PC price vs. performance growth'. By 1997 a 16/400 486 SX @ 33MHX will cost the same as a 4/40 386 @ 20 MHX machine in 1994. The former is considerably faster and more powerful than the latter. Both systems will be available for under £1000[35]. Current prices are substantially higher.

Radio Communication between PC's

Advances in the cellular industry include telephones that will ring no matter where you are (known as personal number networking capacity). The personal numbers, known as '700' numbers are

[35]Rettig M 'Practical Programmer' Communications of the ACM 1992.

already available in the US. Data will travel wire free via the next generation of cellular modems while data terminals will provide new options for businesses using mobile fleets of vehicles.[36] In addition, Olivetti are working on a lightweight phone that will be always carried by the 'owner' and will be the same unit that becomes the out of office cellular phone.

PC's are now able to communicate with each other through radio bands, cutting out the need for cabling between machines. The implications of this are very important, enabling users to be on Local Area Networks (LAN's) for inter office use and Wide Area Networks (WAN's) for connection to the outside (!) world without going through other machines or cables.

> "We see this as a breakthrough product for our mobile workers who need both voice and data communications from their laptops." G Weis, Sears Technology Services Inc.[37]

IBM have a portable available with a built-in radio adapter and with this the user can communicate with his mainframe and LAN from the street or elsewhere. Other firms developing LAN wireless Ethernet connections in their high end notebooks include Apple, AT&T, Compaq, Motorola and Olivetti. Motorola have a two way data communicator already on sale, called Cognito, which acts as a sophisticated pager using the same technology.

> "Within five or six years, nearly every notebook and handheld PC will have some sort of wireless communications capability." A Pearson, Ram Mobile Systems.[38]

The radio bands are currently non-digital but international agreements are being formed across the US and Europe to give digital air bands to the use of PC's to eliminate security problems and cut out cross talk. On July 20 1992 an article in the Boston Globe by Diane Duston said that the Federal Communications Commission regulators had taken sweeping steps towards changing the

[36]Gilster P 'The Bold New World of Wireless Technology' *Triangle Business* 18 November 1991.
[37]Ubois J 'Cellular Carriers IBM announce system for sending digital data' *Macweek* 27 April 1992.
[38]Webb D 'Networks Without Wires' *Electronic Business* 10 Feb 1992

way Americans use their televisions and telephones. One of the proposed changes involves means of allocating space on the airwaves for wireless pocket telephones, two way radio pagers, hand held computers and fax machines. The commission opened its plan to allocate space for these uses in the radio spectrum, for public comment. Declared commissioner Ervin Duggan "It is the brave, new world."

There are still many technology and wave band problems to solve if the market is to take off for these products including the need for universal standards, price, interfacing with the network operating systems etc. It is also widely believed that the wireless LAN market will gain its toehold in portable and pen-based computers rather than by replacing wired nodes on desktops.[39] National has said their price point for wireless LANs is $300 per node compared with $120 per node for wired solutions. Obviously price will be an important determining factor in how fast these systems take off.

Other problems include where to locate the antenna and radio on a portable. Compaq will mold the antenna into a groove on the side of its LTE 386's screen. The computer companies have, in the main, joined forces with technology companies specializing in radio transmission etc. since understanding the spectrum issues of wireless LANs requires knowledge of worldwide spectrum issues for other wireless technologies, such as cellular radio. Europe has been preparing digital standards for some time now (and is acknowledged as being a year ahead of the US in establishing digital wireless standards[40]) and in the US the Cellular Telecommunications Industry Association is finalizing standards for dual mode transmission that will allow digital and analog systems. Separate bands are being pursued by the user committees.

[39]Shandle J 'Wireless LANs: Welcome to the virtual workplace'. *Electronics* 4 Jan 1992.
[40]Leonard M *Electronic Design* 19 March 1992.

Infrared Communication

Another change in office technology depends on the existing electrical wiring in buildings and involves infrared data exchangers. Small businesses with limited funds are the primary market for the 'carrier current' based systems - 110 volt wires as the transmission medium. Using existing electric wiring offers small LAN users the convenience of wireless LAN systems. It is easy to move the PC's as long as they are in range of the centrally located transmitters which beam the infrared to the PC.[41]

The great advantage of infrared is the high data rates they can transmit, currently much higher than wireless systems, although direct paths from the sensors to the units are essential. This system for use within an office environment is very important since studies by NCR Corp., Dayton, Ohio show that over one half of office workers with personal computers move annually. Other studies find that data terminals move as often as 1.5 to 3 times a year with an estimated cost of $200 to $1000 per wiring change. In addition there is the loss of productivity due to downtime for recabling and resolving problems such as cross talk, signal degradation and data security.[42] The infrared technology may eliminate many of these problems and costs. (See Section below on Structured Cabling). There may also be unknown issues such as occupational hygiene that could become problems if infrared technology is developed across the board and further research needs to be carried out on the long term effects.

Battery Technology.

New advances in battery technology were necessary to allow the revolution in portable machines and Japanese Nickel Hydride batteries are now available giving over four hours continual use. Problems of power consumption are the main issues with the portable and radio computers. All the

[41]Webb D 'Hot air: Networks Without Wires' *Electronic Business* 10 Feb 1992.
[42]Leonard M *Electronic Design* 19 March 1992.

computer companies are working with battery developers to reduce the amount of power consumed to give a longer working period to the laptops etc. For example, AT&T reduced the power consumption of its' Safari notebook by half with clever tricks such as putting the processor into sleep mode for a brief time after each keystroke.

Other developments

New technologies are being developed to increase processing speeds and Gallium-arsenate chips should soon be commercially available, which will allow speeds five to six times faster than silicon chips. Optical disks, similar to compact discs for music should offer continued huge increases in storage capacity. One such disc today can store over 1,000 megabytes of data, which is more than sufficient to handle the contents of any multivolume encyclopedia. At present rates, entire libraries will be accessible electronically for little more than the cost of pop records.

These machines will all be connected to information networks through the same technology as used in cellular phones. Data, written text, newspapers, TV shows, movies, teleconferences and a variety of other information could then be displayed in multiple high resolution images projected on flat wall monitors. Other cheap small computer chips are likely to be embedded in cars, home appliances, and other items.

> "Life will take place in a living landscape of interacting, intelligent machines that help us through our daily chores. David Nagel, head of Apple Computer's Advanced Technology Group thinks this development will be 'a real turning point in the way we live, work and play.' " W Halal[43].

Networks and New Types of Hardware

Integrated Information Networks

[43]Halal W 'The Information Technology Revolution' *The Futurist* July/August 1992 p11.

Another very important development is the growth of the information infrastructure. Integrated information networks will greatly expand the communications traffic already flowing via satellites. Fiber optic cables now being installed by telephone companies are expected to reach most American homes by the mid 1990's giving

> "Virtually everyone access to an enormous range of information and communications services. And open system standards like the Integrated Services Digital Network (ISDN) should soon make it possible to create multimedia systems that link together all machines, data, voice, video, text and nay other type of information into one seamless whole." W Halal[44]

Much of the information will be transmitted via optical fibers. A piece the diameter of a human hair can transmit as many as 1 billion bits of information per second in digitized pulses. This is 1 million times faster than most modems available today. Fiber optics are also more secure, do not get disturbed by electrical variations and are cheaper than copper wire. These 'superhighways' of data will provide the infrastructure for standardized communications protocols such as ISDN. As mentioned, ISDN allows users to interface with others, regardless of equipment or data type. By the end of the 1990's the majority of US homes will be connected by fiber optic, although the cost of doing so is large.

> "In the year 2000, fully 85% of American homes will subscribe to a cable service and nearly 70% of those subscribing will have access to ISDN or two way cable services. These interactive services will provide a wide variety of educational and entertainment offerings that will vary from home shopping and banking to on-line databases." S Cunningham and A Porter.[45]

Telephone companies are implementing digital and ISDN services fast and Cunningham says these services will eventually outstrip even cable television. (There is an on-going debate with questions to Congress about the charges being made by the TV Cable companies and whether they are reasonable or exploitative. (NPR News, Boston July 26 1992.))

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[44]Halal W 'The Information Technology Revolution' *The Futurist* July/August 1992 p11.
[45]Cunningham S & Porter A 'Communication Networks' *The Futurist* Jan/Feb 1992 p19.

More and more information will be transmitted by these communication networks, in an increasingly personalized and interactive media than TV or newspapers. A worry is 'narrowcasting' whereby advertisers and politicians can address very specific consumer and political interests. Other worries include 'digital footprints', a loss of privacy and increased discrimination by greater use of databases. The upside is the potential for easy referencing of huge amounts of data.

There are also developments which involve potential for linking the home into the networks such as ISDN without actually having to use fiber cabling. Franklin Davis of The Thinking Machine described a system whereby the information will be able to travel on top of the existing twisted copper cable telephone lines without any need for other wiring. Information retrieval systems such as Wide Area Information Services (WAIS) will be easily usable at home and in the office by everyone. It will no longer be necessary to be in the office or in a cabled home to receive the world wide information networks. Networks will exist at three levels; personal, corporate and world, and easy access to all will be available from the home. Some of the more powerful network systems are run off different server systems such as Massively Parallel Processors, which provide much greater speeds in information processing. (See Section below on MPP)

The WAIS system is built around two notions, one that the user of a search and retrieval system should be able to provide feedback to assist or retarget the search; and second, that the best way to search for articles (or any other documents) is to search from a good example, not just from one or two keywords. This 'relevance feedback' means in practice that the WAIStation searches again the articles that are the most interesting results of the initial search. In this way, it is easy and fast to

find information on the exact subject required. Many searches can be carried out at once, in many sources and a search can easily be narrowed or widened.[46]

WAIS will link the individual into the world networks, such as the Dow Jones services, other directories of Servers, entertainment facilities and as gateways to other networks.

> "The goal of the Wide Area Information Servers project is to create an open architecture of information servers and clients by deriving and standardizing a computer-to-computer protocol that will enable users to find and question servers." Thinking Machines Corporation[47]

It is hard to predict which types of users will first use these extensive services, at least initially when prices are highest. The fact that the Dow Jones Corporation has based an extensive database available by subscription on a WAIS network, backed by Massively Parallel Processors (See Section below), implies financial subscribers will use the system. Thinking Machines and KPMG, the worldwide auditors and management consultant, have developed uses for the system which have been profitable for KPMG. For example, the speed of obtaining data on potential new clients, their clients and competitors and linking all this information with KPMG's worldwide internal networks has already helped the company win new clients. The speed of the systems provide almost instantaneous information retrieval. The networks are widely used by research based organizations, although they are expensive to use. Professional Companies, market research companies, corporate divisions and financial services are likely to be among the many that take full advantage of the networks that will become available internationally.

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[46]Thinking Machines Corporation WAIStation - A User Interface for Wide Area Infomation Servers: User Guide, Prototype Version Version 0.57 February 1991.

[47]Thinking Machines Corporation WAIStation - A User Interface for Wide Area Infomation Servers: User Guide, Prototype Version Version 0.57 February 1991 p1.

Massively Parallel Processing

Many more massively parallel processors will be available with their vastly faster and more powerful capabilities. Computers will be able to operate highly sophisticated software that will do the work of experts, learn talk, read handwriting and serve as personal assistants. The difference between the;

> "Brute number-crunching force of the old hierarchical computer architecture's that used a single large processor, is that neural networks use many processors operating in a fluid parallel networking mode that simulates the network of cells forming the human brain." W Halal[48]

Neural networks using as many as 1 million processors are expected to be working by about 1995. With more powerful hardware, these should realize the exciting applications of artificial intelligence that have been promised for decades

Visualization is much easier when parallel machines are used and this too will aid the way the information produced can be utilized. It could be possible to imagine centers where massively parallel processing is paid for by the unit and building complexes shared the facilities that were too expensive for single tenants to support. Other shared services such as video conferencing could take place from the same central point, or even a specially dedicated technology building.

As described above, and in the Section on Integrated Information Networks, massively parallel processors may provide a competitive advantage for those using the WAIS systems that use them due to the speed and much more specific search methodology.

Fit Out Technology - Structured Cabling

[48]Halal W 'The Information Technology Revolution ' *The Futurist* July/August 1992 p11.

Structured Cabling

Structured cabling is currently available and it could be said that it has more to do with layout than technology. Traditional cable distribution is in rings, linking up points on a particular circuit. If one machine is moved, the whole network is disturbed. If a structured cabling system is introduced and the building is 'flooded' on a grid by grid basis ,at the fit-out stage, with every point linking directly to a central communication point, no cables will need to be moved when a terminal is. The cabling becomes part of the infrastructure.

The cost of installation is high at over two and a half times the cost of traditional cabling but figures show that on average it costs £800 to move a terminal but if structured cabling is in place the costs go down to £10 and 10 minutes to do it. The average office repays the cost in 18 months.[49] When a structured cabling system is linked with a good system of furniture that reflects the type of working environment sought great flexibility is achieved. This is not nearly as desirable as a completely portable cableless system but for the moment, until the price and problems are more satisfactory it is a better compromise than no flexibility at all.

Technology Summary

- Computing power grows faster than the users can plan for.
- Integration across disciplines and applications is evolving slowly but is now happening (for example, the combination of the radio and computer industries to produce the wireless networked portable.)
- Networking will become as ubiquitous as the phone - it will be the phone.
- The increase in computing power changes possibilities qualitatively.[50]

The new technology advances will eliminate the need for two sets of power into a building since the computers will run off battery power and therefore will not be disturbed if the mains fail. This

[49]Information from interview with Andrew Harrisson of DEGW, Space Planner and co-author of the Intelligent Buildings in Europe report 1992.

[50]Davis F 'Intellectural Capital and Information Technology' Symposium on the Construction Industry in the NorthEast: Opportunitites for the 21st Century CCRE MIT 1992.

obviously does not yet apply to large scale mainframes but smaller systems will be able to cope just on battery power with one mains linkage. It may even get to the stage where no back up generator is needed, therefore less space is used, less heat is created and less air conditioning is required. Cabling, distribution and back-up space is saved potentially.

Air conditioning requires as much power to cool the air as it creates heat to do so. By producing less heat in the first place, with the use of the smaller portable computers, very much less energy is used, air conditioning is not needed and less heat is created by the air conditioning itself.

As computers become able to communicate with each other via radio and infra-red technology (see above) less cabling capacity is needed. Cabling is expensive and often is so complex that it becomes impossible to modify the system for fear of damage to another, unknown part. The classic example here is Midland Banks' building Suffolk House, London, where when it became necessary to recable, a new false floor was laid on top of the existing one to accommodate the new cabling. None of the old cabling could be removed as nobody knew what was what. (DEC have now produced a new system called 'Cable Manager' to keep track of the cabling as well as design specific elements.)[51]

It is interesting to note that all at once, three industries will be severely hit by the introduction of the new wireless computer technology: The cabling, power generation and air conditioning businesses. But the building professions and owners of older property should be delighted with the new rejection of very advanced technology in some fields and the opportunity for refurbishment of currently obsolete buildings.

[51]Robathan P *IB Focus* The Intelligent Building Group Newsletter Vol.1 Issue 1 1992 London.

3.2 Work

A) Introduction

> "The world of work is changing because the organizations of work are changing their ways. At the same time, however, the organizations are having to adapt to a changing world of work." C Handy[52]

A sign of the new type of organization Handy talks about is the change in language we use to do so. Previously organizations were seen as pieces of engineering with structure, parts, inputs and controls etc. In the 1990's language changes to politics, with cultures, networks, teams and coalitions. The ways in which Handy and other discuss work reflect these changes and they, in turn, reflect the technical changes that have allowed the new organizations to evolve. All these issues affect the way space is used and required in the office environment. New generic types of organization as perceived by Handy in his book 'The Age of Unreason'[53] are discussed below.

B) Types of Organization

i. The Shamrock organization

The Shamrock organization represents the many types of businesses and organizations which are today made up of three very different groups of people; all with different expectations, managed differently, paid differently and organized differently.

1. Professional core workers.

   These people are essential to the organization as they own the organizational knowledge. They work hard, long hours and are well compensated. These workers are also expensive and as a consequence there are fewer of them, despite the increases in turnover all successful organizations have undergone. In the future pay will be more and more dependent on bonus' related to company success.

2. Non Essential Labor / Contracted Out work.

[52]Handy C The Age of Unreason HBS Press 1989 p87.
[53]Handy C The Age of Unreason HBS Press 1989.

The work that is done by people not crucial to the organization is contracted out. This is cheaper for the firm and accounts for the rise of the contractual fringe. Here workers will be paid for results, not time and thus managers will no longer be able control work as they have historically done. Managers must not be tempted to cut fees because otherwise poor work is done.

3. Flexible labor Force.

Part time workers and temporary workers. Companies will try to expand and contract their service to match requirements of their customers. It is far cheaper to bring in additional labor when necessary. This work will suite those who do not wish to be at the core and who may not want to work full time.

This three level workforce has always existed but its scale has now altered dramatically. The types of organization that will first be affected by the changes mentioned above include smaller professional and service firms as well as larger corporate divisions who may find it in their favor to have a more flexible work environment for a number of reasons. The potential affect on office space is large as headquarters and cores shrink and more work is contracted out.

ii The Federal Organization and the Boundaryless Organization

Federalism implies a variety of individual groups allied together under a common flag with a shared identity. Autonomy is combined with cooperation. Companies who can achieve this form of organization will benefit from size in the market place but small unit size giving flexibility and a sense of community.

In this type of organization, the central office function will also be very small and tight with all the repercussions this will have on the office markets.

> "In an Economy founded on innovation and change, one of the premier challenges of management is to design more flexible organizations. Companies are replacing vertical hierarchies with horizontal networks; linking together traditional functions through interfunctional teams; and forming strategic alliances with suppliers, customers, and even competitors. Managers are insisting that every employee understand and adhere to the company's strategic mission

> without distinction of title, function or task" L Hirschhorn and T Gilmore.[54]

Many executives now want to create the 'corporation without boundaries' where:

> "We knock down the walls that separate us from each other on the inside and from our key constituencies on the outside." J Welch CEO General Electric 1990 Annual Report.

Traditional organizations have had to change with new technologies, fast changing markets and global competition. The roles people play whilst dealing with this new business world have altered too. The psychological boundaries of 'authority', 'task', 'politics' and 'identity' have to alter for every piece of work and teams are now necessary, providing a mechanism for bringing together people with different but complementary skills and tying them to a single goal. New ways of working are now needed and are possible by knowledge based workers with new technology coming together, either physically or electronically to solve specific problems.

iii Triple I Organization

The third type of organization is the Triple I Organization. (I^3) The core of organizations in future will be Triple I concerns, with the I's standing for

- Intelligence
- Information
- Ideas

$$I^3 = AV$$

The Triple I organization will create Added Value. It is no longer enough to have brains in a competitive information society; good information is needed to work with as well as ideas if value is to be made out of knowledge. The new organization will:

> "Make added value out of knowledge. They need also to be obsessed with the pursuit of truth or, in business language, of quality. To that end, the wise organization increasingly uses smart machines, with

[54]Hirschhorn L & Gilmore T 'The New Boundaries of the 'Boundaryless' Company' *Harvard Business Review* May/June 1992 p104.

> smart people to work with them. It is interesting to note how often, already, organizations talk of their 'intellectual property'." C Handy.[55]

The wise organization knows that their smart people need to be identified as individuals, specialists, leaders and professionals. (The words 'manager' and 'worker' are according to Handy, dropping out of use.) They also know that they need to be obsessed with learning if they are to keep up with the pace of change. *I*ntelligent and therefore powerful workers can only be governed by consent and not command and 'a collegiate culture of colleagues and a shared understanding is the only way to make things happen.' Although these ideas do not seem revolutionary Handy argues they are. (More information on Triple I Organizations are found in Appendix E)

Many of the new people that the smart Triple I organizations will need are women, because there is unlikely to be enough skill in only half of the workforce. The recession has probably reduced the need for the immediate moment but it will return as skill levels required increase. These women will be able to dictate the way they work and where they do it. In other words, the flexible working habits described elsewhere in this chapter will be used by those who work in the Triple I organizations.

C) Knowledge Workers and the New Workforce.

Electronic relationships are starting to move the power base in modern societies. Authority figures can use computers to dominate subordinates, but information systems naturally will move power to the real users of the information, often lower down the larger institutions. In the Industrial age decisions flowed uniformly from the top to the bottom to keep production lines moving. In the Information age the creative use of knowledge is needed to solve new problems in the high-tech global economy.

[55]Handy C The Age of Unreason HBS Press 1989 p142.

> "Leadership throughout the developed world no longer rests on financial control or traditional cost advantages. It rests on brain power....The biggest shift is the shift to the knowledge society in all developed countries. Knowledge workers know that their knowledge, even if not very advanced, gives them the freedom to move. In the tremendous reshuffling of American business during the 1980's, a great many displaced managers and professionals found they could get new and often better jobs. Their knowledge made them free.....They are not committed to any one employer or any kind of employing organization." P Drucker.[56]

The changes to come in large organizations are largely to do with the new knowledge workers and the new emphasis on flexible team work in the 'boundaryless organization'.

The result of these trends could be a work environment governed by constantly changing groups collaborating within a web of social/information networks spanning the globe. The concept of the 'virtual community' developed out of the 'virtual reality' of the ever improving technology could become the status quo with international capacity to work on single projects from numerous sites. When these 'electronically mediated relationships' link with the brain like power of the parallel/neural computers, described in the technology part of this chapter, a new form of 'global intelligence' could exist. Once again, the case of Thinking Machines and KPMG (mentioned in the Section in this Chapter on Integrated Networks) is a good example, where KPMG secured a major new client partly by receiving very up to-date information, from a world wide network of officers from the same organization.

D) Home work, cottaging, telecommuting

> "Despite the growing use of information services, many people are ambivalent about replacing live social interaction with electronic exchanges. A 1987 survey of Honeywell employees found that 56% would continue to go to the office every day if given the choice of telecommuting, 36% would split their time between home and office and only 7% would work at home exclusively. And a recent poll of experts revealed doubts about the widespread acceptance of

[56]Drucker P The New Realities Harper & Row London 1989 pp173-186.

> teleconferencing, electronic shopping and telecommuting even 15 years into the future." (see Appendix J for Delphi forecast)" W Halal[57]

A sizable portion of American workers could do their work at home through the screens of their PC's. Clerical and professional workers are coming to dominate the work force and many of their tasks could be away from the office. There is an increased reliance on small, flexible, specialized service companies which are especially well suited to employ home based workers. (Hugh B Stewart).

Alvin Toffler in The Third Wave quoted a number of eminent company presidents in the USA who maintain that 25-75 % of what they do could be done at home, given the right technology. Francis Kinsman in 'The Telecommuters'[58] quotes examples of organized homeworker schemes in the US that let their staff work at home when not needed in the office but encouraged them to get ahead in their work, by a bonus system. Productivity at Freight Data Systems in California increased so much it paid for the cost of the home terminal in five months. Today, this capital cost would not even be an issue with the ever decreasing cost of the laptop PC.

Telecommuters have choice and people like to have choice. They can choose when and where they work, and conservative estimates suggest that by 1995 there will be four million teleworkers in the UK out of a total population of fifty million.[59]

Because people are generally social animals, information technology services are unlikely to replace direct relationships and interaction, rather those services will offer a viable alternative to the real thing when more convenient. Road traffic is badly congested in most cities and in London,

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[57]Halal W 'The Information Technology Revolution' *The Futurist* July/August 1992 p12.
[58]Kinsman F The Telecommuters John Wiley and Sons 1987.
[59]Confederation of British Industry 'Teleworking along with British Telecom' Conference held in London September 1989.

commuting is becoming harder with ever more pressure on deteriorating rail networks. As information systems become easier to use and more accessible in terms of the networking available, they will more frequently provide the option of working either at home or nearby.

The choice of working at or nearer to home will make the working day longer potentially both for the individual and for the company. This will enable work to be scheduled flexibly to occur over, say an 18 hour period each working day, or 24 hours if necessary. A wide mix of company's from financial services, to professional to corporate could benefit from working with these innovations.

An alternative to commuting to the office and to working alone at home is the 'telework center', a regional satellite office that allows employees to work near their neighborhoods. Pacific Bell already operates two such centers in California and Hawaii, and has created a center in a suburb of Honolulu for use by employees of local firms and government agencies. Similar centers exist in European countries and Japan. (W Halal) The facsimile machine, the phone, video conferencing, telex, the two way video screen and the on-line abilities described earlier may help reduce the pre-eminence of the city as the work place in the next century.

E) Virtual Office

AT&T now give their sales forces cars, portable computers, phones and fax's' and they no longer have a desk or an office, since their technology allows communication to go on-line. The sales teams are out of the office so much and all of their information and work is in their portable computers that to pay for office space did not make sense. Instead they office is treated as a club. IBM and DEC (Digital) are two other examples of companies who make use of the 'virtual' portable office.

F) Office as Club and Hot Desking

Handy and others write about the concept of the office as a club and how it becomes the central place where teams can choose to come together or where the non core workers can meet, socialize, share ideas etc. As more workers operate out of the home or 'virtual' offices, then the central place needs to have a different function. As a pilot test, Digital in Finland allowed the sales team to fit out their 'club' area as they wished and they purchased sofas, garden furniture, good rugs etc. The smaller space they were allocated reflected the lack of need for permanent desk space (each sales person had storage and communal work stations were part of the 'club' fit out.) The scheme has been very successful with the non core workers benefiting from a better environment when they wished to be in the office and Digital benefiting with lower overheads and a sales force with no excuse not to be on the road for most of their time.

A problem with hot desking and shared common space is the lack of the individuals' identity and anonymity. IBM in Japan have overcome this issue by creating a system of lockable trolley desk units. Each individual worker has a trolley desk in which she stores her files, memorabilia, family photos and reference books etc. When she is in the office all she has to do is wheel the desk from storage and slot into the larger desk system that she chooses to use from the hot desks available that day. All telephone and electronic communications are passed through to the individual (if they do not already have a '700' 'phone number.) The system appears to work well, giving identity, flexibility and storage, whilst conserving the most expensive office space in the world (after London).[60]

The savings in office overheads, less time spent in travel to and from the office and less time wasted in the office may be advantages of the new work ways. However, the shrinking time spent

[60]Information from discussion with Harvey Bryan of the GSD, Harvard. The case study on IBM facilities in Japan was written in 1992 by Professor Hardcopk of the Center for Building Performance and Diagnostics at Carnegie Mellon, Pittsburgh.

in less day to day interaction may impact negatively on the output of the workers but it is not yet possible to draw conclusions on any large scale. By no means all organizations will run as clubs, but it is likely that sales oriented work forces may move in this direction (see earlier examples from AT&T, IBM and Pacific Bell). Other examples could be professional offices such as lawyers, accountants and insurance brokers where home 'on-line' networks allow the employee to send and receive work, library information, fax, communicate with colleagues and work without traveling. In addition, designers, architects, advertising agents, some aspects of corporate life as well as many others will benefit from working this way. Only where people need people all the time is it infeasible. The office will still be central for internal and external meetings as well as for organized daily / weekly meeting or social times for the exchange of ideas and problems.

3.3 Conclusion

This chapter contains much information which may not, at first sight, appear to be directly applicable to the topic of obsolescence and 1960's offices. However, until all the forthcoming changes in work and equipment are known it will not be possible to understand what type of environment will be wanted or suited.

There are undoubtedly immense problems which have not yet been resolved in the fields of wireless networking, battery life and portability and security of data. In addition it is clear that the 'experts' do not yet agree what space specifications the new equipment will require, such as the claim by Paul Robathan that no air conditioning will be required in offices because so much less heat will be generated, and which is refuted by DEGW and the IBE report as set out in the next chapter. Robathans' claims may be true in some places and not others, but main frames will still require air conditioning, UPS and other back up.

However, it is important to look beyond the detail, to the whole picture, and when the predictions regarding work are put together with the technology that will allow and encourage Federal, Shamrock and Triple I type organizations, it becomes obvious that some changes in the work place will occur.

The new wireless technologies will not be of benefit to all industries, most notably those which are going to rely more heavily on intensive computing power such as SUN 'work stations' and large mainframe backup. In addition, this type of computer cannot do without an uninterrupted power supply. 1960's office buildings are not easy to fit out with the complex requirements of a UPS and the type of tenant that would use this level of processing power is likely to need more floor space than the 6000 sqft per floor available. Thus the type of tenant likely to occupy a 1960's office building is not a large scale processor of material from a computer system that requires more than a localized UPS. Even if only 50% of the developments are going to happen to 30% of organizations, this will present a need for different work environments for a substantial number of people.

The combination of the developments described in this chapter and the next could lead to a rejection of the quality of office environment that has been occupied for the last ten years. Instead, a more people considerate style could be introduced. There will be a fundamental change in the way we occupy and use office space in the future. Since World War Two the changes have been relatively superficial and the purpose of this paper is to show how radical the changes will be in the next decade and into the twenty first century.

CHAPTER 4

NEW BUILDING TYPES FOR THE 1990'S AND BEYOND

CHAPTER 4

NEW BUILDING TYPES FOR THE 1990'S

4.0 Introduction

At the same time that advances in technology and changes in work practice have been developing there have been considerable shifts in attitudes as to what type and quality of space and services organizations need. In Europe especially there have been moves away from over technically sophisticated buildings and back to naturally ventilated and lit spaces. Building intelligence is taking on a new meaning and must incorporate satisfactory solutions to answer questions on the health of the work force, management of the building, flexibility of the workspace and energy cost amongst others.

4.1 Intelligent Buildings

The concept of the intelligent building has changed since it was first introduced in the early 1980's in the US, when it was considered to be a collection of innovative technologies applied to building management, office automation and communications. It then developed, by the mid eighties to be able to respond to organizational change over time. Today with the effective application of IT recognized as essential to any business, a good definition is:

> "The intelligent building provides a responsive, effective and supportive environment within which the organization can achieve its business objectives. Building intelligence is the efficient use of buildings, space and business systems to support staff in the effective operating of the business." The Intelligent Building in Europe Study.(IBE)[61]

[61]DEGW The Intelligent Building in Europe - Executive Summary. A multi-client study by DEGW(London) & Teknibank (Milan) in Association with the European Intelligent Building Group. 1992 p5.

In other words, the definition of an intelligent building seems to have been 'diluted' to a building which concentrates on providing an environment with the appropriate level of technology. The starting point of the new definition of intelligent buildings is an understanding of the users business, with the space and buildings in a supportive role, with three layers of solutions, as described by the IBE report:

1. **Providing effective building shells**:
   Which can absorb information technology and allow the organization to grow and change.
2. **Applications of IT to reduce costs and improve performance**.
   These include:
- Building automation systems to support the environmental control of the building, and provide personal user control.
- Space management systems to manage change, monitor use and control access.
- Business applications that support internal and external communications, process and store information and enhance the presentation and manipulation of ideas.

3. **Provision of integrating technologies and services**:
   Effective businesses require management information that is integrated and easy to assimilate. A new range of technologies and services are emerging with the objective of integrating disparate organizations, systems, data and personnel to focus on the common goal of increased business effectiveness.

The IBE model of the Intelligent Building is shown in Appendix F.

The most important benefits to users of intelligent buildings identified in the IBE report were the increased flexibility, quality of the working environment and increased productivity in the work process, thereby achieving cost benefits in the medium term and improving the overall effectiveness of their business. These actual benefits were different to the perceived benefits from those not actually occupying an intelligent building, which were minimization of building operating costs and an increase in flexibility. Where the tenant is the landlord, then the building has the opportunity of being best designed and most intelligent for their purpose, if they have taken good design advice.

The IBE report states that an intelligent building is likely to have certain minimum requirements and standards. They are listed below:

Floor Depth

Glass to core depths of 30-40ft (9-12m) allow room for cellular office space or open plan plus storage.

Glass to glass depths of 44-59 (13.5- 8m) allow 2 or 3 zones of office and support space.

Story Height

Floor to floor heights of 13'2'-14'9" (4 - 4.5m) provide maximum flexibility and good visual comfort.

Floor size and configuration

Contiguous floor sizes between 5380-27,000 sqft (500 sqm and 2500 sqm) provide the most usable spaces.

Landlord space efficiency, expressed by the ratio of net internal area to gross internal area, should be 84 - 87% if the building is mid to high rise, or 90%+ if low rise. Tenant space efficiency, expressed by the ratio of usable area to net internal area, should be 85% or above.

Floor loading

A floor loading of 4 kN/m is more than sufficient for general loadings. If necessary special areas should be zoned for higher loadings to support heavy items of furniture or equipment.

Planning and partition grids

A 4'3" (1.35m) grid allows 8'9" (2.7m) wide offices and relates well to building components in 600mm modules. A 4'9" ft (1.5m) grid will also provide reasonable 9'9" (3m) wide offices, but there may be problems with building materials not matching the grid.

Communications infrastructure

Risers for voice, data and other services, should not take up less than 2% of gross floor area (GFA) and there should be the capacity to easily knock through another 2% if requirements increase in the future. The cores containing the risers should be well distributed to avoid cable bottlenecks. There should be a communications room measuring 6'6" x 3'3" (2 x 1m) serving every 5'4" sqft (500 sqm) of GFA. There should also be adequate space for dual service entries into the building and space on the roof, or nearby with good sight lines for satellite or microwave dishes.

Building skin

In hospitable environments, where noise or pollution are not a problem, the building skin should include opening windows and solar control, possibly linked automatically to a building automation system. The BA system must also be able to monitor the opening of the windows so that the heating, ventilating and air conditioning system can be turned off or re-configured. There are obvious exceptions for tall buildings and polluted environments, but the building skin should still incorporate solar protection to minimize the cooling load.

The greatest gains from building intelligence have been experienced by organizations which have accepted a 'culture of intelligence', absorbed the new technologies and restructured their way of working and using space. Each aspect of intelligence has associated costs and benefits:

- **Efficiency** benefits will reduce operating costs including energy, maintenance and reconfiguration costs.

- **Effectiveness** benefits increase work output, quality and satisfaction of workers and customers, and can be measured in terms of turnover per staff, profits and customer response.

The real cost of intelligence should be assessed not on initial costs but on ongoing costs for commissioning, updating and operating the systems.

> "A great deal of end user dissatisfaction stems from the suppliers not communicating the need for continuous inputs and costs that are required to make systems effective over time." IBE report.

The cost of a worker (salary, insurance and benefits) are approximately ten times those of the building occupancy cost (rent, rates and operating costs). Cost reductions through improving operating **efficiency** are important but the greatest gains of building intelligence will come about from **effectiveness** gains achieved in organization performance. (See Appendix G for IBE model of cost savings and benefits).

There are those who disagree with the minimum requirements of an intelligent building such as Paul Robathan, the recent past chairman of the Intelligent Buildings Group. Robathan argues that the amount of power that was presumed would be needed in the office in 1980's was a gross overestimate (see diagram showing predicted watts/m) and that due to the portable computer technology the minimum requirements are less than DEGW and the IBE state. The technology changes described earlier in this chapter will not require the previously predicted demand for energy and the wireless communication will remove the need for false floors and low power devices decrease the need for air conditioning.

> "It a shame to have the technology dictating the shape of the building. It is crass stupidity to design a building to suit a single class of technology, as the average building changes its technology 10 to 15 times every 40 years".[62] P Robathan

The authors of the IBE study state that not all buildings are capable of becoming intelligent. For example, if natural ventilation replaces air conditioning, the space regained from the suspended

[62]Slavid R 'New lease of life for dinosaurs of the '60's' *Construction Weekly* April 1, 1992.

ceiling may be needed to allow air to circulate more easily. "We have said there are certain critical dimensions that buildings shells need." (A Laing, DEGW/IBE) report. However, they do agree that intelligent buildings are not all about installing technical gimmicks and that they failed in their pure technical form. They go onto state that buildings should be concerned with the following, in this order:

1. Business management
2. Space management
3. Building management.

The flexibility of an intelligent building allows the different levels of elements that need modifying throughout a buildings life to occur when needed:

1. **Building Shell:** The permanent structure and enclosure of the building, which lasts 50 75 years, whilst the functions within may change many times over.
2. **Servicing:** The heating, ventilation and cabling infrastructure of a building, which may have a life span of 15 years or less before the technology becomes redundant.
3. **Scenery:** The fitting out components with a life span of 5 -7 years which adapt a building to the specific requirements of an organization.
4. **Settings:** The day to day rearrangement of office furnishings.

An example of a 'low' technology but intelligent new building is Digitals' new Worldwide Center of Expertise in Telecommunications in Sophia Antipolis, Provence, France. All services, plus lighting circuits and air conditioning are contained in a 1'4" floor void and the suspended ceiling is only needed to contain the sprinkler system specified by the US insurers.

Dec claim that the new building which cost $2 million to build has helped to cut operating costs by 30% per annum, with overall savings adding up to $750,000 per year. The buildings costs will be completely recouped in two and a half years, according to DEC. This building comes closer to the definition of a green building and has many concepts in common.

4.2 Green Buildings

> "There is growing public awareness and concern that man's activities are posing very real threats to the environmental balance of the world, and a developing recognition that resources are now being consume and waste produced at a rate which cannot be sustained indefinitely."
> 'A New Balance'[63]

Public feelings are being reflected by a growing political will to mitigate environmental pollution and destruction problems. Considerable pressure for regulatory change is being generated by the European Community and as a major user of world resources, in the form of construction materials, land and energy, the property industry cannot remain detached from environmental concerns which are increasingly affecting other sectors of the economy. Much of the research and efforts have gone into seeing how new buildings can be modified, but in the current oversupplied market, the occupier is likely to have an increasing influence in the design of buildings.

As discussed earlier, asbestos is a problem in many 1960's UK buildings but nothing like to the same extent as in the US. The reason is that whilst most of the 1960's UK towers were concrete framed, the US models were steel with full asbestos spray on fire protection. This necessitates a far greater degree of abatement than in the UK where some fire proofing, tiles and other fit out materials were asbestos. In many cases in the UK it is possible and probably safer to contain the asbestos rather than remove it, especially if it is not disturbed or broken up in any way.

More worrying is the fact that other materials still being used today in the office may be as dangerous. Examples here are rock wool and fiberglass insulation which have small bristles in the fiber which act mechanically in the same way as asbestos. The bristles ulcerate and pierce the lung walls and pierces, allowing infection possibilities. Other problems potentially include the gases given off by laminates and particle boards (such as MDF). They contain both chloroflourides

[63] Jones Lang Wootton, McKenna & Co. and Gardiner & Theobald A New Balance - Buildings and the Environment. A Guide for Property Owners and Developers. London 1991 p1.

which damage the environment and fomaldihides which are carcinogenic. The fomaldihides are used for bonding agents in surface finishes, in rugs, plywood etc.[64]

Concern with 'Sick Building Syndrome' which is now acknowledged as a serious problem, as well as the growing importance of energy efficiency and running costs, leads to a very real interest in 'green' criteria. It may well be that buildings will need to be issued with 'Green Certificates'. As in the 1980's in terms of good design, green design may come to have valuation impacts, with a building that has been designed in accordance with green criteria letting sooner and on more favorable terms. This could also affect long term rental performance of buildings at subsequent rent reviews.

The growing awareness of environmental issues is already having an impact on the UK commercial property market with the signs being that these issues will grow in importance in the next few years. In this case occupiers will scrutinize alternative buildings ever more closely and investors will wish to be assured that their buildings conform as far as possible to 'green criteria'. For this reason, it is possible to understand a growing mistrust and dislike for air conditioned space and a desire for a return to windows which open and a naturally controlled environment. This is also occurring in the US but largely in connection with Sick Building Syndrome.

Sick Building Syndrome is now associated with six features, although little has actually been proved about specific causes.[65]

- Sealed airtight shell.
- Mechanical heating, ventilation and air conditioning systems.
- Use of materials / equipment that give off irritating toxic fumes or dust.
- Fluorescent lighting.
- Application of energy saving measures.
- Lack of individual control over environmental conditions.

[64]Information from discussions with Harvey Bryan GSD, Harvard University 1992.
[65]Sykes J M, Sick Building Syndrome: A Review Health and Safety Executive. 1988.

Indoor air quality (IAQ) is the measurement in the US for the interior air environment in office buildings. Materials such as laminates and particle boards give off gases, especially for the first six months following installation. Initially buildings which used mechanical systems to distribute air to deeper space used approximately 25 cubic feet/minute. In the 1970's due to the energy crisis and increase in fuel costs, systems were developed or modified so they only distributed 5-10 cubic feet/minute of air, which was the basic requirement for enough air for the occupants to breathe.

The systems described above recycled air, as it was too expensive to heat/cool fresh air. The pollutants were produced from the synergy's of certain gases mixing together, the effect of the gases alone and the fact that the mechanical system was unable to remove them because of the reduced speeds of air distribution. At the same time an increasing use of synthetic materials was being introduced into the workplace and therefore more gases were building up.

At the same, in the mid 1970's, the Environmental Protection Agency was developing standards and equipment to measure IAQ. Once workers begun to complain of feeling unwell in their offices the EPA stepped in and in many cases found a higher level of pollutants in the sick buildings than outside. There is now a new part of the engineering industry devoted to solving air handling problems in retrofit situations. Good facilities management teams now have a building 'hygienist' to deal with IAQ issues.[66]

Much has been and can be written about the syndrome, but the importance here is to note that the 1960's buildings under discussion in the UK have:

1. Opening windows with non air tight shells
2. Centralized air conditioning
3. No application of energy saving measures

[66]Information from discussions with Harvey Bryan GSD, Harvard University 1992.

Thus whilst they are conceptually a long way from the state of the art, new green and intelligent buildings are being constructed in Europe, such as the NMB Bank Headquarters in Amsterdam[67], they may have more features in common than they do with the big buildings of the air conditioned eighties.

The NMB Building is a 'groundscraper' in the middle of a high density office, residential and retail development with narrow floor plates to maximize the use of daylight (with no desk further that 23 feet from a window). Interior louvers bounce daylight entering the top third of each exterior window onto the ceiling of office spaces. This, combined with the window lined atriums in the tower provide a significant amount of the buildings' lighting. The building is double glazed but if constructed today would instead be built with high efficiency super windows.

In addition, the skin incorporates solar collecting panels. Much heat recovery and savings occur with construction costs an extra $700,000, whilst annual savings are in the region of $2.4 million. The overall landscaping, courtyards, gardens, and water features also save money as shown by a drop in absenteeism and an improvement in morale and image. The Bank is now seen as progressive and creative. The managing director claims business has grown dramatically. It may be that green building will have a quick payoff and the connections between 1960's towers and a better environment need to be emphasized. An advantage in this instance is that the Bank built the building for their own occupation and to their own specification as a single-tenanted property.

There is no one set of criteria which defines an environmentally friendly building, rather a wide range of measures capable of implementation, each with environmental advantages and some with disadvantages. Planned maintenance subsequent to commissioning and handover is essential if a building is to be assured as an asset and performance maintained. Many measures which can be

[67]Browing W 'NMB Bank headquarters - The Impressive Performance of a Green Building.' *Urban Land* June 1992. (Nederlandsche Middenstandsbank)

taken have little or no impact overall on the construction/running costs of a building; Some (such as energy saving measures) may result in substantial net cost reductions, but with the penalty of a less sophisticated level of internal comfort. It seems that in Europe, at least there is a growing desire for an environment that the individual can ultimately control, even at this cost.

> "European industrial democracy has accelerated an unstoppable and ultimately universal trend towards higher and healthier standard of office working life." F Duffy[69]

> "Office buildings such as the SAS headquarters in Stockholm, the huge NMB building in Amsterdam and the Colonia Insurance company complex between Cologne and Dusseldorf represent not only a very high standard of office life but they are, by the hermetic, artificial, and one has to say old fashioned standards of North America, very green indeed." F Duffy[68]

New labor legislation in Germany has recently declared that no office worker can be more than 25' from a window. Since German standards, especially in the construction and environmental fields dominate Europe, there must be considerable likelihood of this regulation becoming an EEC directive or legislation. Even assuming that it would not be retroactively implemented the implications for European building design and image are dramatic. The narrow floor plates of the 1960's tower would be back in fashion. In Switzerland it is now not possible to air condition any building without special requirements such as a computer room. These legislative controls reflect the will of occupiers and their concerns for their own health as well as the greater environmental good.

People, as described elsewhere in this chapter are becoming a new type of more discerning office workforce. As new knowledge workers they have more bargaining power and are far less tolerant of poor quality offices. As Duffy says, to the new generation of workers, the environment and their own well being matters a lot. This is why, even in the middle of a major recession, issues to do

[69]Duffy F 'Beyond Rubber Plants' *Landscape Design* London May 1992 p23.
[68]Duffy F 'Beyond Rubber Plants' *Landscape Design* London May 1992 p24.

with sick buildings, child care, ergonomics, working hours, and health and safety are becoming more and not less important. The knowledge based workforce has the power to reject the buildings it dislikes.

4.3 Energy Conservation

According to Harvey Bryan of the Graduate School of Design, Harvard University there is now in the US a move towards 'demand side management' of fuel consumption. The utility companies are very concerned not to have to increase their production capacity and so encourage lower consumption. This is because they make their money on a return on invested capital rather, than on the amount of fuel sold, and therefore conservation is very attractive as the capital investments have a longer life. For this reason, they are prepared to pay for the individual corporate users to install energy conserving lights and have savings programs based on kilowatts per hours offset.

An example is with the use of typical fluorescent strips which use 40 w and contain magnetic ballast which hums. The energy consumption is largely in the ballast. New energy efficient tubes produce the same light output but only use 28-32 w showing a 25% saving in power. This is done with electronic ballast and energy efficient tubes and are very much quieter. They also have a longer life and produce a better color rendering. It is now also possible to rent energy efficient lamps from the utility companies or to claim rebates on products that have been approved by them. Free standing lamps which previously used 60-70 w bulbs now can be replaced with compact fluorescent bulbs which use 13-18 w and last ten times as long.

Utility companies, such as Boston Eddison, and South California Eddison have pioneered the programs. Other companies are now spinning off from these programs with, for example, lighting firms selling design services to relight existing buildings and taking their fee as a percentage of the rebate and savings achieved. Scallop Energy set up by the Shell Corporation, charges a fee based

on historic averages of consumption and will provide the new products and take the savings, guaranteeing the clients fixed lighting bills. Puget Energy in Seattle now has a consulting company, with a branch in Boston, advising the building industry on taking advantage of demand side management programs. The same type of programs have been set up by the utility companies to make HVAC and motor replacements for such uses as large fan motors, elevators and pumps for water systems.

The UK could benefit enormously from programs such as these since many power plants in the country burn coal and produce excess CO^2. As stricter regulations concerning output eventually come into place, and it is likely that European pressure will force the issue in the long run, then conservation becomes more important. This would give the owners or occupiers of inefficient energy consuming 1960's buildings that are largely lit by fluorescent tubes an incentive to modernize and further reduce fuel costs.

It is possible to introduce modified air conditioning systems into buildings even where the floor to ceiling heights are low. For example, in Washington DC. the buildings have lower height restrictions than in Crystal City across the river. One of the means of controlling height is to use water based systems and not centralized air systems. This is what is used in Washington. The problem with air systems is the duct space they require whereas water systems are local and use no additional height.[69]

In the West End of London, other ways of saving on floor to ceiling height are being used in a current refurbishment at 3-5 Burlington Gardens, built in 1971/2. The floor slabs are very thick (6"-7") and 3" of screed that rest on top of the slab are being taken up. This also serves to reduce the load on the deck. In addition, the new air conditioning is being distributed on a local basis and

[69]Information from meeting with Harvey Bryan of the GSD, Harvard University 1992.

not from a central core to avoid overlapping ducts which also reduces the need for ceiling height. At some places in the building, channels are being made in the underside of the beams so as sink the duct work in, again to preserve height. In a new building lattice, beams can be used and the air conditioning ducts can be threaded through them.[70]

4.4 Internal Design Issues

The relatively new field of Space Planning is important in expressing the way organizations wish to organize themselves and in allowing theory to be put into practice. Firms who wish to work more efficiently can successfully utilize older space if it is well laid out. An example is the London law firm of Berwin Leighton which occupies 1930's space in the City (Adelaide House, London Bridge) at very low rents. However, the firm had expanded enormously during the 1980's, but did not wish to take on the high rental obligations of new buildings. Instead they remodeled the offices internally but at the same time completely reconsidered how their workforce worked.

The professional staff and partners had always occupied large individual offices. For some of the day the lawyers were usually meeting internally with one or several other lawyers. Other parts of the day were occupied with meetings outside the office or in meeting rooms which were always in short supply. The space allocated to the support staff was internal and often inadequate. The space planners, architects YRM, realized that the actual time spent with over two people in any one office was very small and therefore enormous savings could be made by allocating the individual offices far less space. The professional staff and partners now all have offices of approximately the same size, unless they are shared. They are no larger than 7' x 10' maximum and contain a fitted desk beneath the window, a swivel chair, a central table and a second chair. Alternative layouts just include window, desk, chair, desk and chair, giving the professional two work surfaces and room for one visitor.

[70]Information from meeting with Graham Love and Michael Holland of Jones Lang Wootton, London 1992.

The additional space created by the more than halving in size of individual offices was dedicated to better secretarial facilities and to the creation of many meeting rooms of different sizes. It was always difficult to book a meeting room and time was wasted with lawyers going out to the offices of other lawyers. The new system works, well as all in the firm have small offices, including senior partners, and there are always meeting rooms available for gatherings of more than 2-3 people. There is much more efficient use of space since the offices that are vacant during the day are costing less, and the meeting rooms can be scheduled for use during the quieter times, as well. In addition, the psychology of the equal office for all works well with morale improved by the fact the junior lawyers feel good that the senior lawyers share their working conditions.

This is just one example of good space planning. This skill can be applied to old space that was thought unusable and it will be seen in the next chapter on case studies that 1960's floor plates can be very good for different users including professionals. One system that may develop in the future with offices where many workers work at home, out of the office etc. but come together for meetings is the inclusion of a 'Decision / Technology' room. There could be one brainstorming room in the deep space of an office which was equipped with all the up to date technology an organization uses, but not all the time by everyone. On line information and screens could link workers up from different locations for joint conferencing or just for information gathering and analyzing sessions. This goes back to the ideas of the office as club and coming together for special meetings.

In Europe, some office workers today seem to want buildings now that are again full of cells as opposed to open plan space. The ideal is seen to be individual office rooms whose doors can be shut, whose lighting and furnishing can be arranged by the end user, whose windows can be easily opened and shut and whose furniture and equipment is designed to the highest ergonomic standards.

> "Other benefits emphasizing quality of work life are stressed and this includes providing pleasant and comfortable surroundings for staff to work in. Current interest within the business community in theories which stress values and company culture and in particular a commitment to excellence is a reflection of the need not just to satisfy but to inspire workers if they are to perform well constantly. A company's premises we believe have a role to play which goes beyond the hygiene factor." Premises of Excellence.[71]

New systems of office furniture can influence the work patterns and management of a group. An office that has the benefit of structured cabling and a system of furniture that will allow multiple layouts could be very valuable. It is hard to talk about the concepts of layout and space planning without addressing work issues of Chapter 3. This is why, before the case studies were addressed it was necessary to set out what the possibilities for the future are.

4.5 Conclusion

The powerful knowledge workers of the coming decade will demand better work environments for the time they do spend 'in the office'. The growing awareness of environmental matters and the increased emphasis on personal health and work conditions will encourage developers and owners to, somehow, make their buildings better in this sense. As the concepts of building intelligence are linked with green ideas, a new type of environment is perceived. Energy conservation, individual environmental control, window access for every worker and easy ability to rearrange the work space will be a few of the basic criteria that occupiers will look for. This understanding will be necessary along with a grasp of the issues outlined in Chapter 3 on work practice and technology change.

What is relevant to this report is the fact that the 1960's office blocks have more in common with the new generation of green and intelligent buildings and the way people will work in the next

[71] Wilson S Premises of Excellence - How successful companies manage their offices A study sponsored by Herman Miller 1985 p57

generations than the large floor plate, mega cabled and air conditioned buildings required in the 1980's. The opening windows, the layouts capable of providing light, individual offices and the lower running costs may provide a better alternative to many occupiers than the mass of available new space which does not necessarily fulfill more of their needs.

> "Such an understanding will enable integrated intelligent services (business, space and building) to be highly responsive to users' needs. As patterns of work change to include the wider range of work settings and the (fuller) use of portable communications it may be more useful to think of intelligent systems or intelligent networks rather than buildings. The building becomes a node in an organizational network and.....extends to linking a number of buildings together, in terms of communication systems and automation systems, creating a 'virtual building' which maximizes both efficiency and effectiveness gains." IBE report[72]

If companies apply some of the building integration applications there will be no need to keep moving and buying more office space. With the new means of working that lie ahead, and with the technology to sustain it, the working environment will alter considerably.

All of the ideas discussed in this chapter and the previous one (Chapter 3) will affect the way we work in the future, from the technology, to work patterns, to environmental concerns. Somehow they will all come together and dictate the working environment of the next decade.

[72]DEGW The Intelligent Building in Europe - Executive Summary. A multi-client study by DEGW(London) & Teknibank (Milan) in Association with the European Intelligent Building Group. 1992

CHAPTER 5

CASE STUDIES

CHAPTER 5

CASE STUDIES

5.0 Introduction

Three buildings, all from the same early 1960's era and all on London Wall were chosen for the case studies to analyze whether they would be fit for use in the coming decade despite the fact that:

> "In many respects London Wall is the epitome of the 1960's urban design: an urban motor way with overhead walkways and point towers that establish an edge to the city. Many of its buildings are being remodeled or rebuilt, creating over the next years one of the most comprehensive new neighborhoods that reflect the changing patterns of taste and urbanity." R Burdett[73]

All three show very different layouts, specifications and life cycle stages. Through an analysis of the individual buildings' specific features it may be possible to understand whether these buildings are functionally obsolete, according to the definitions at the start of Chapter 2 or whether the changes in technology, society and work discussed later in the same chapter will affect the future use and perception of the buildings.

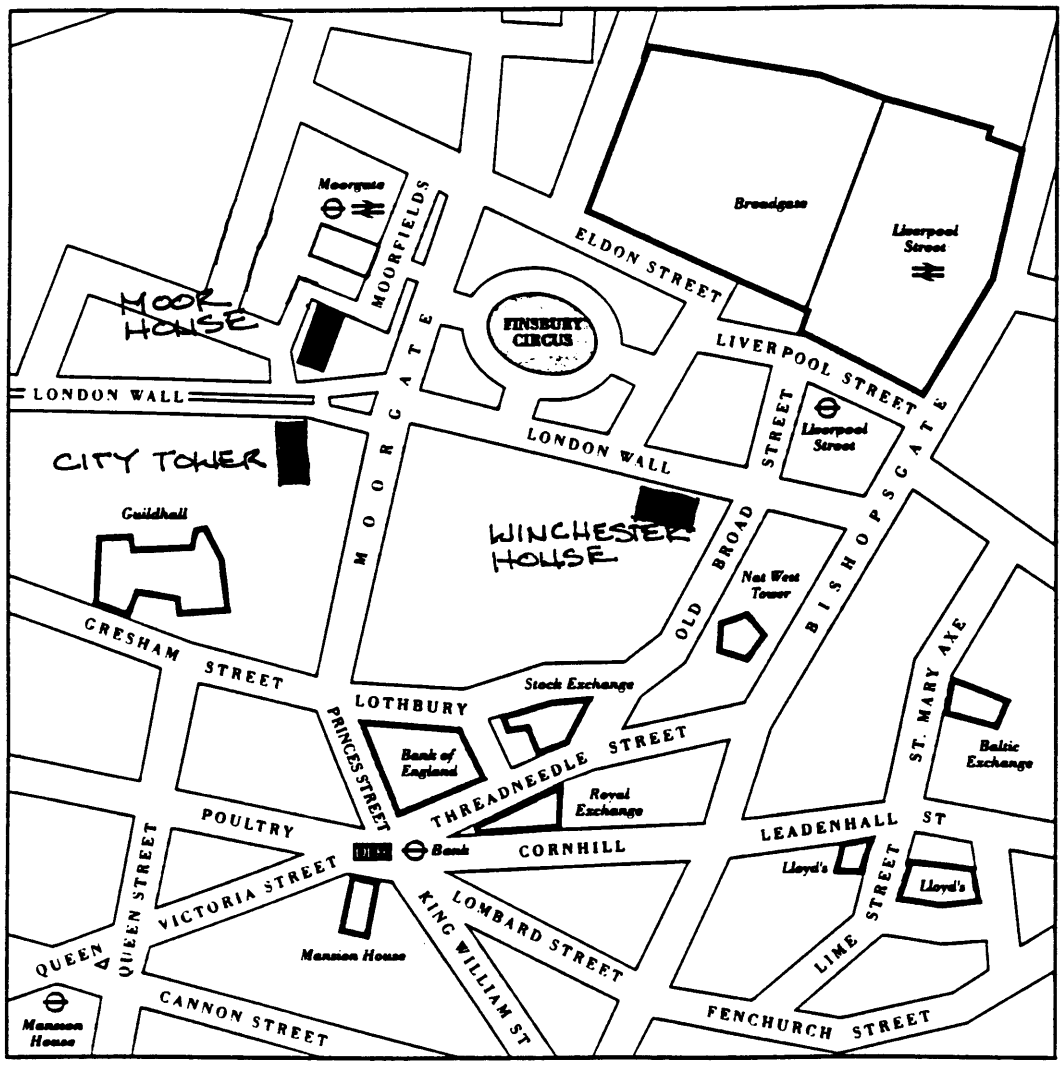
The three sites chosen were:

- **Moor House**
- **Winchester House**
- **City Tower**

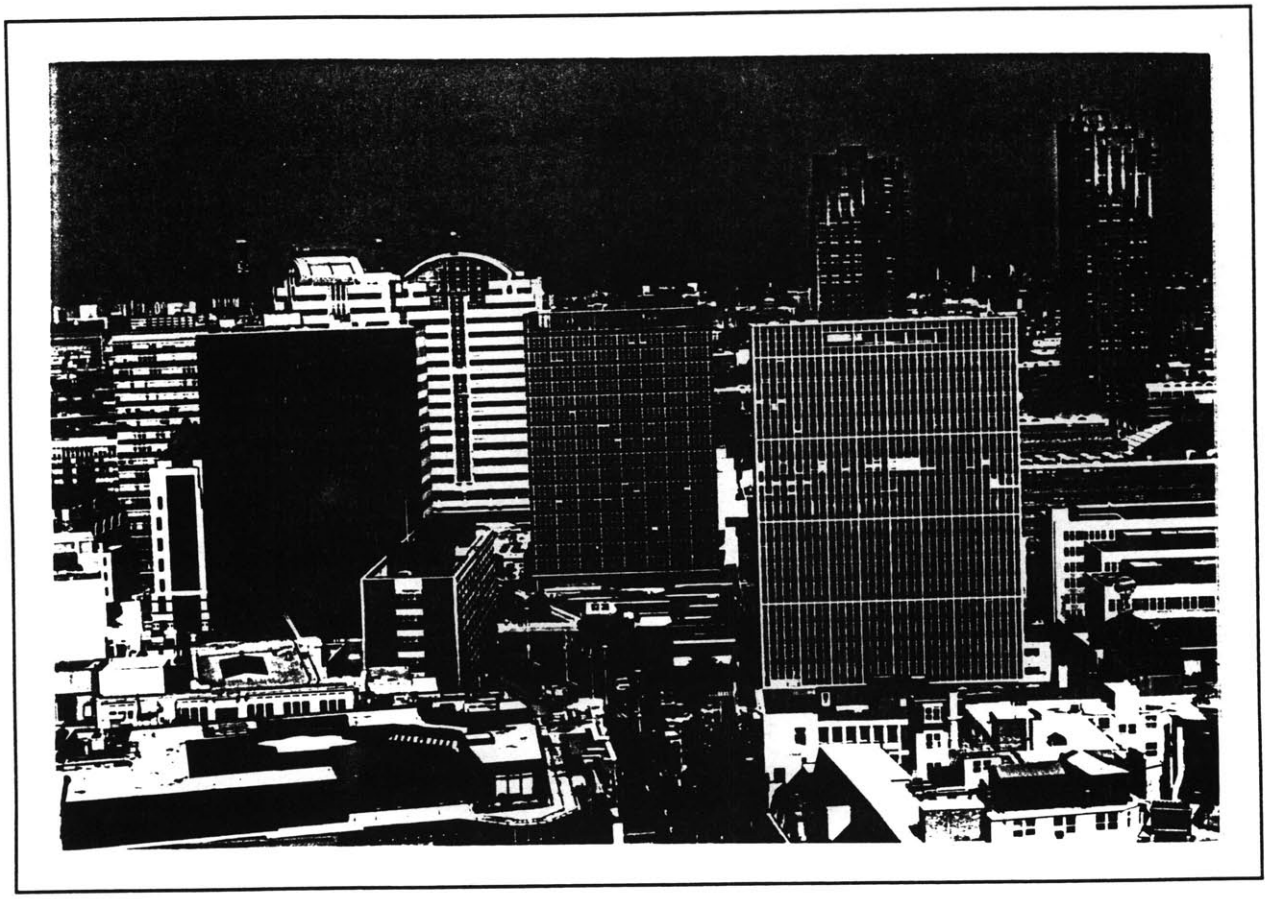
Their location is shown on the plan on the next page.

[73]Burdett R Ed. 'Urban Redevelopments' City Changes The Architectural Foundation London 1992.

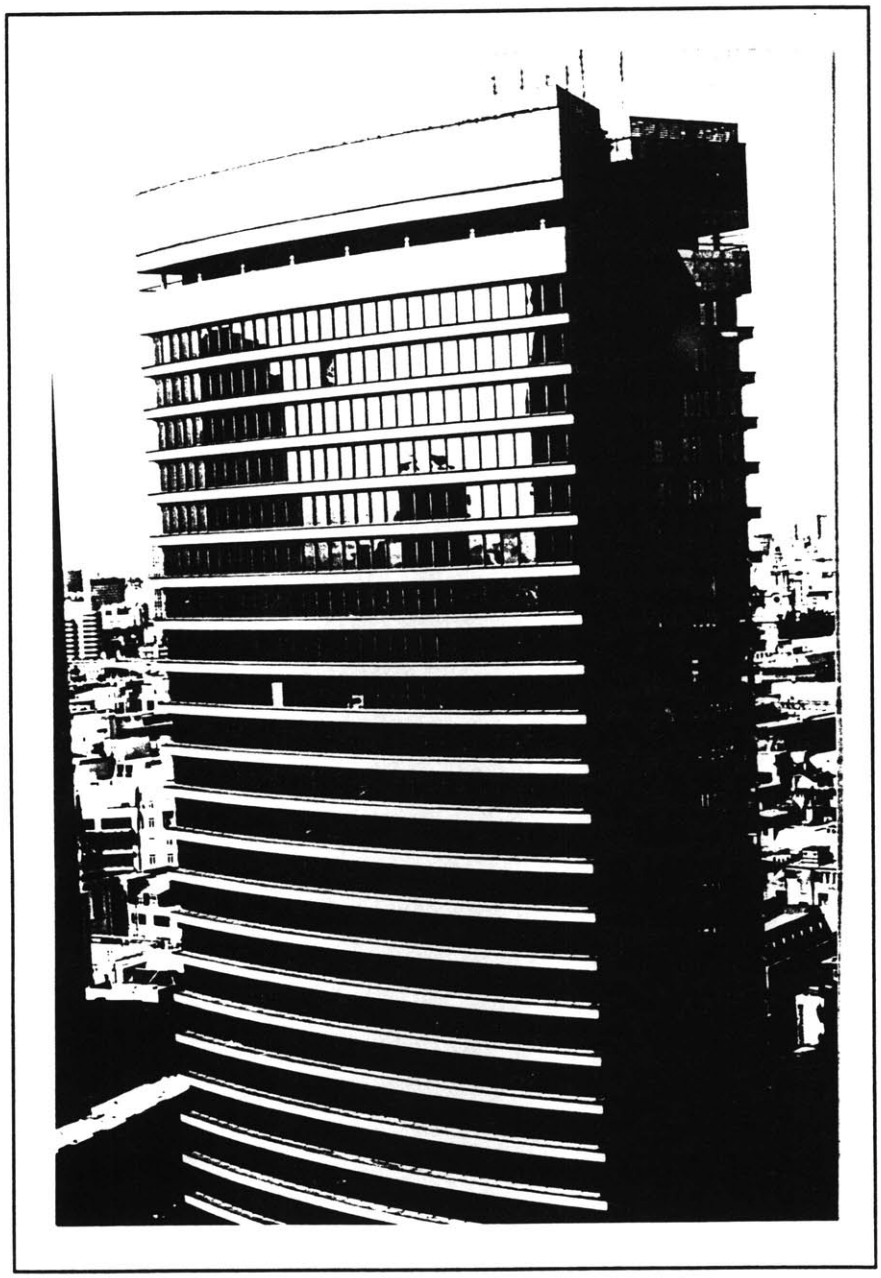
Plan to Show Location of Case Study Sites on London Wall, London, EC2



Photograph of London Wall and the 1960's developments



Photograph to show typical 1960's Tower in The City



5.1 History and Current Status of Case Study Properties.[74]

A) City Tower

A1) Introduction

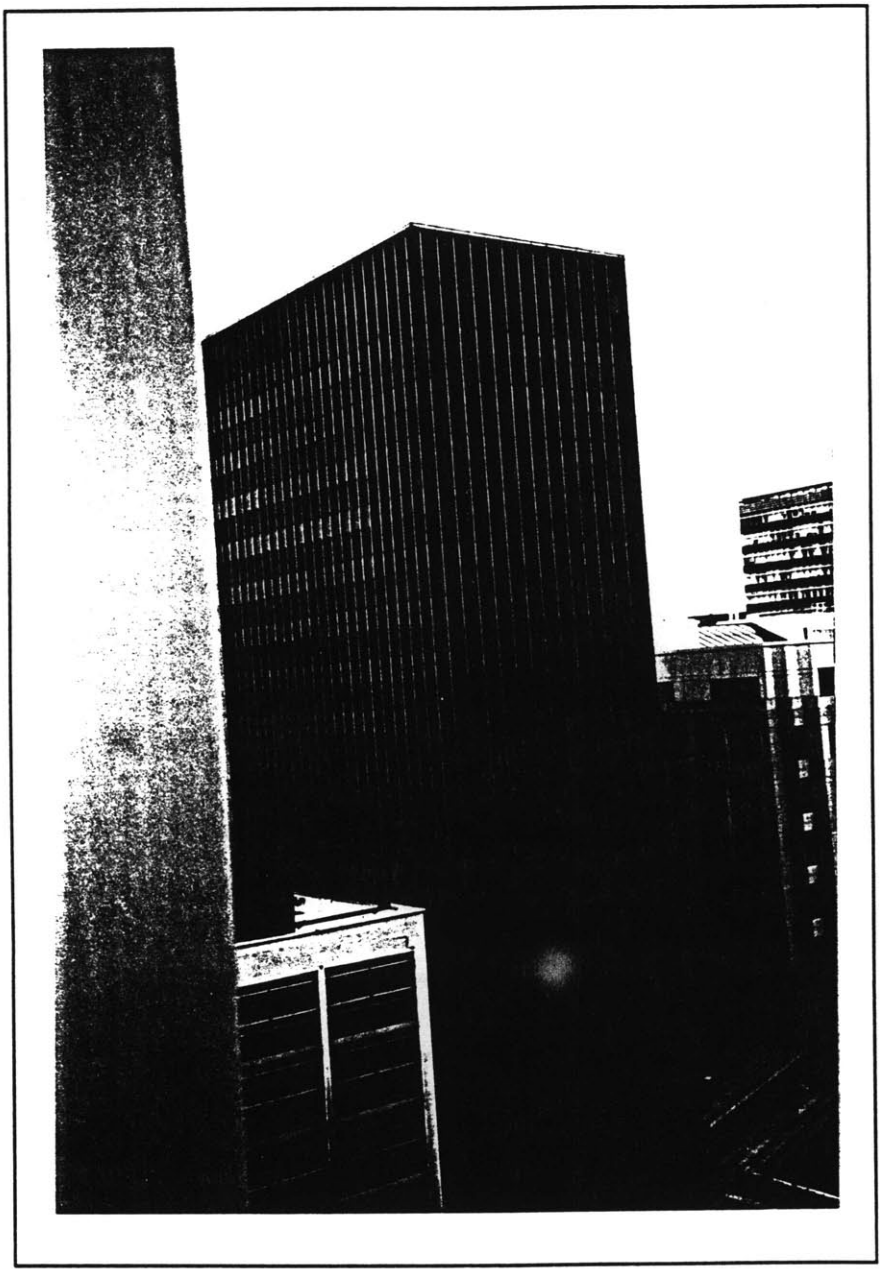
City Tower, originally known as 40 Basinghall Street, was built in 1961, with a concrete frame and pre-cast concrete floor panels. It was one of the six buildings specified by the City Corporation for Route 11 (See Chapter 2 for history of London Wall) and therefore is similar in form to the other five buildings, and to Moor House in particular.

The tower's current owner Wates City Property, were part of the original development team. They carried out a complete renovation/refurbishment of the building in 1983/1984 and the description of the building below is as it is today (1992) and not as originally built.

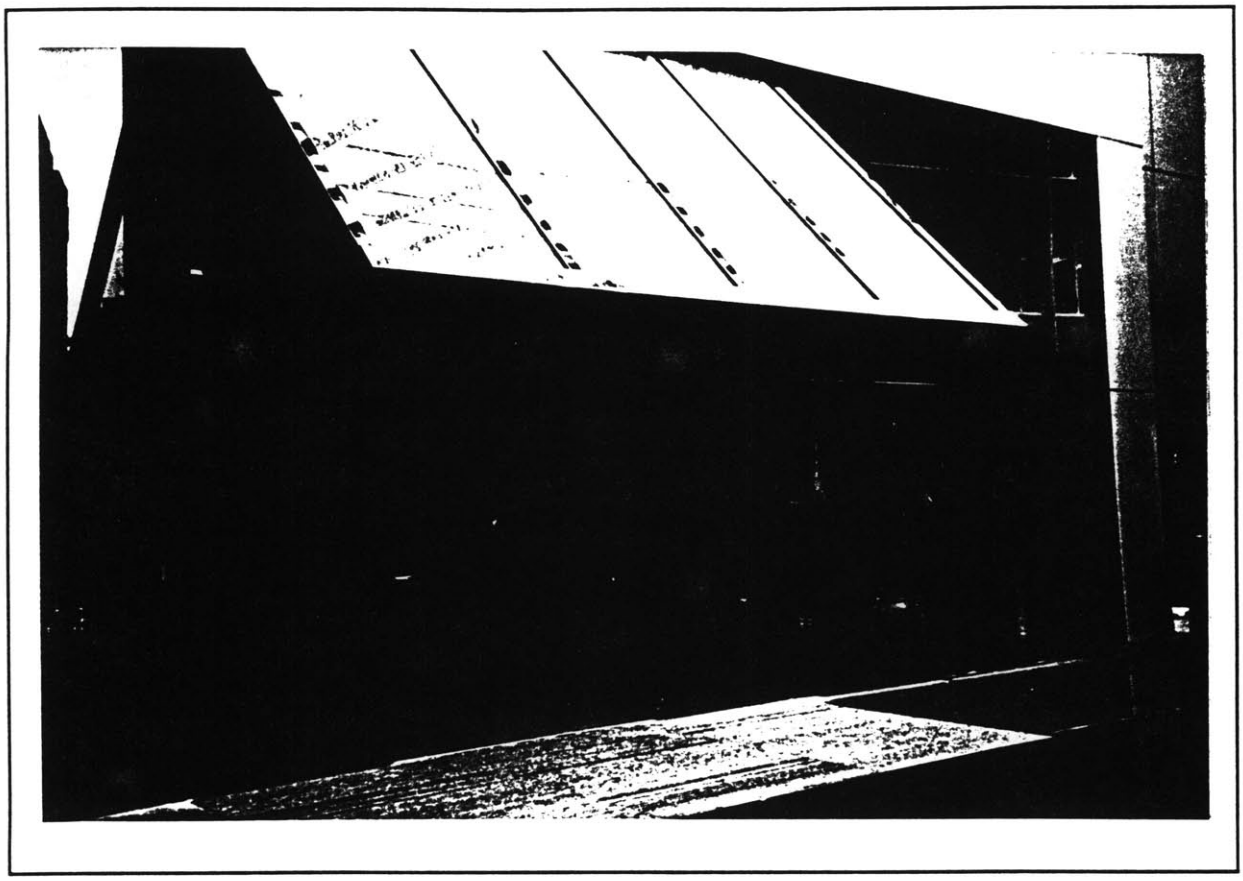
In the early to mid 1980's it was perceived that there would be a shortage of attractive, modern, multi-let office space in the City. The location of the tower at 40 Basinghall Street which was less than 400 yards from the Bank of England and the center of the City was very good. The restrictive planning regime at the time was likely to prevent any higher plot ratio being achieved and therefore it was feasible to think in terms of a major refurbishment rather than rebuilding.

[74]Case study information was gathered from discussions with asset managers, building managers, architects, leasing agents and owners involved with the three buildings discussed.

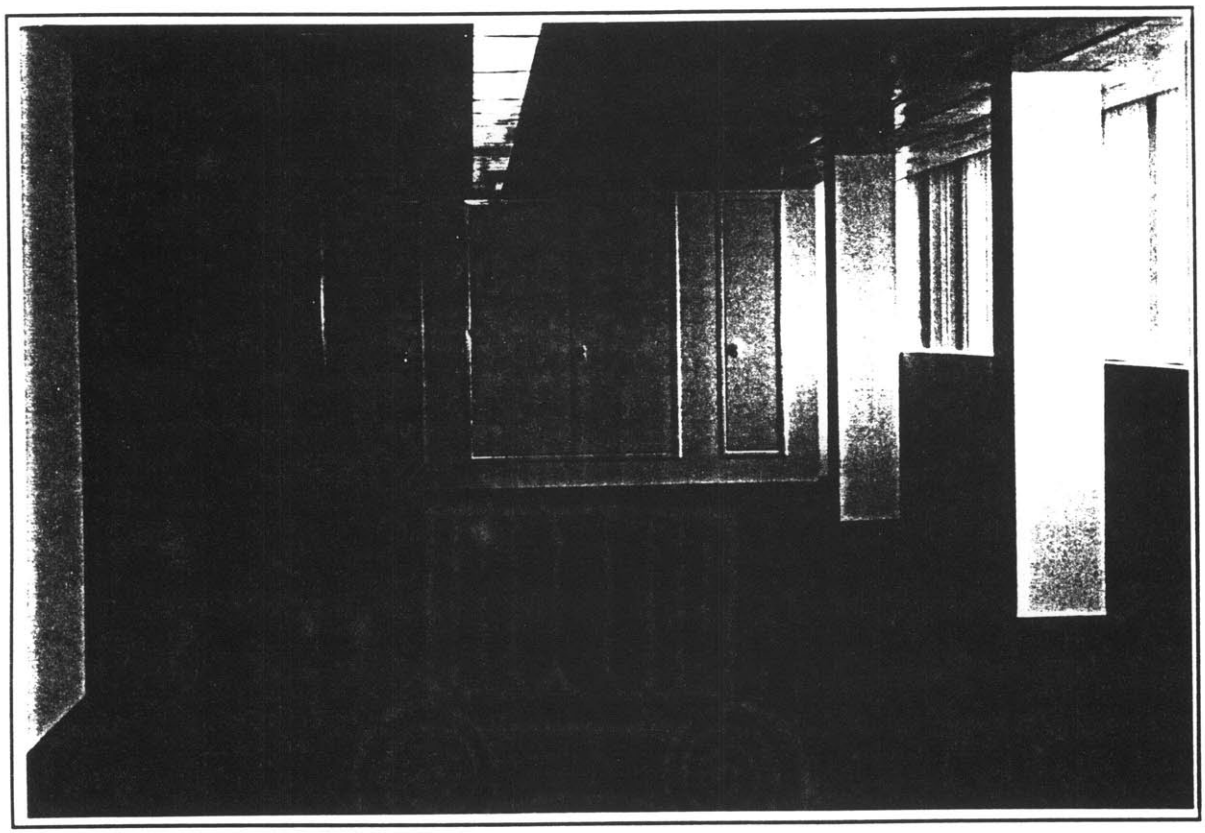
Photograph to show Exterior of City Tower, London, EC2

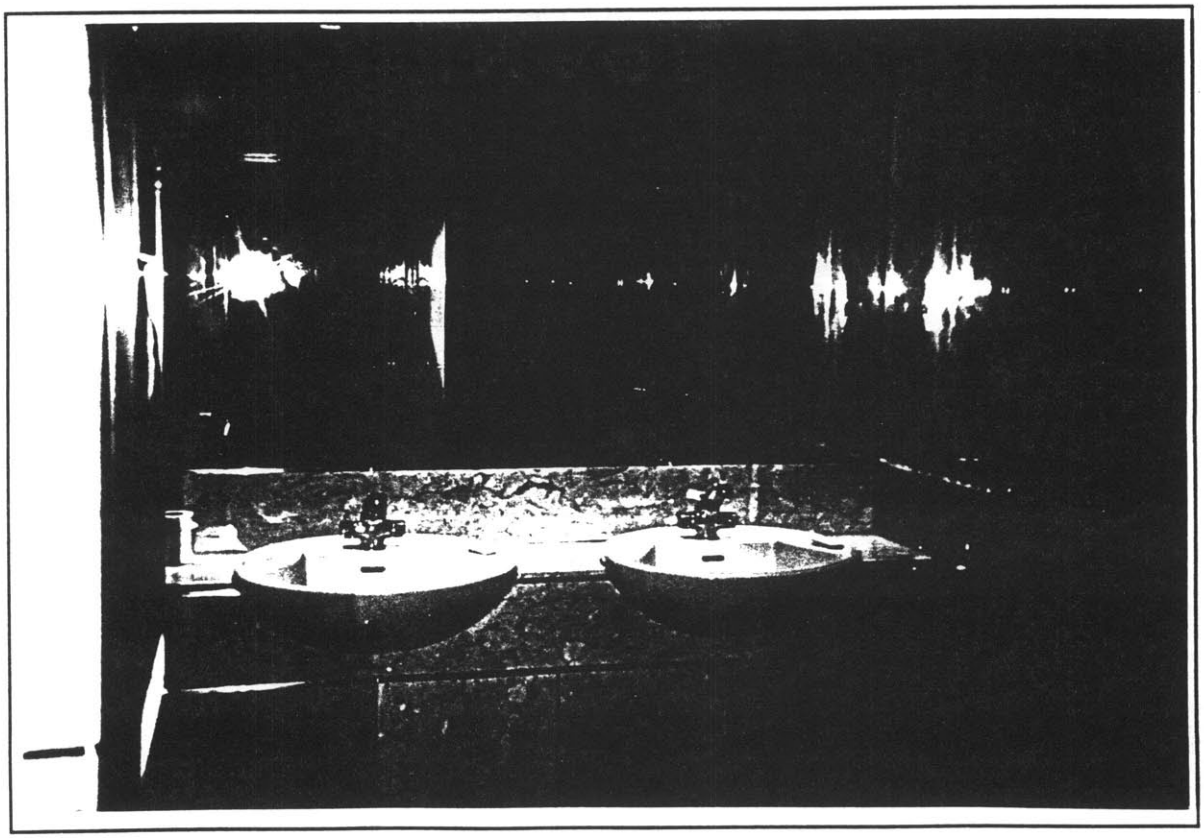


Photograph to show Entrance Canopy at City Tower, London, EC2



Photographs to show Interior of City Tower, London, EC2





A2) Refurbishment and Description

A complete stripout of the 18 story tower ensued, followed by the installation of new services, elevators, double height lobby (previously only 1 story), windows and cladding. The end result was a sleek, good looking blue glass tower with additional floors created by utilizing roof and service space, although the elevator does not reach the very top floor, occupied by the developer themselves. The views at the upper levels are impressive. The space is well finished with high quality ceilings, blinds, carpets and walls provided. Asbestos abatement was necessary in some parts of the building with the ensuing expense since a complete stripout took place.

The air conditioning appears adequate when the floors are vacant (and they are kept very cool for prospective tenants to feel) but the management staff implied that the system was substandard but that they 'could get away with it'. The upper floors have continuous opening windows on all elevations. The glass is clear, in contrast to the new blue, reflective paneling that clads the rest of the exterior.

The new double height lobby was created at the expense of some of the second level deep space but the result is impressive and attractive. Clad in rose gray granite with a 20 ft wall of water feature and sculpture area it is well maintained and provided with good 24 hour access and security. The training and attention of the staff reflects Wates program of customer care.

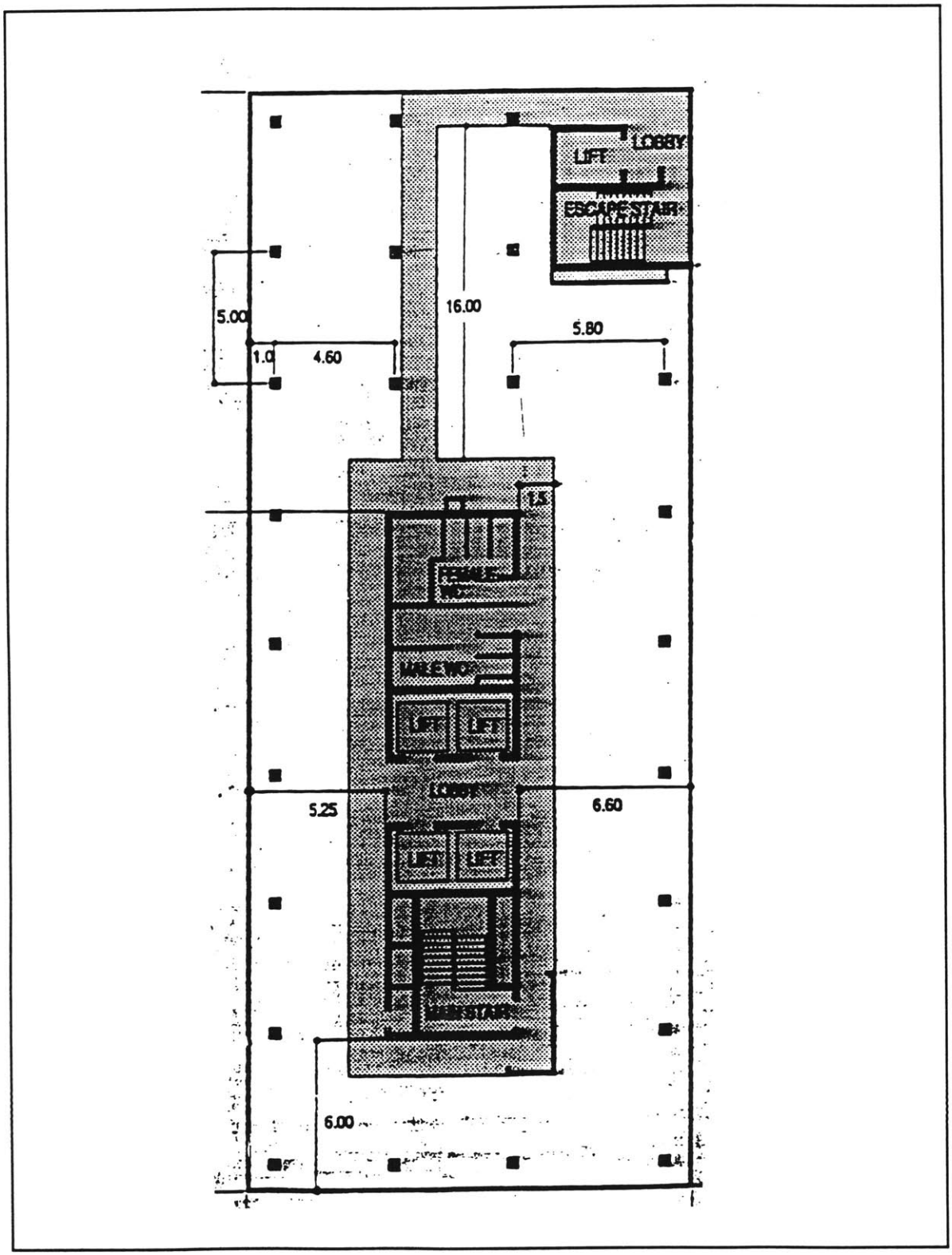
A3) Layout and Building Description

The building has a typical usable floor area of 6200 sqft with a central core containing lobby, 4 high speed 'talking' elevators, and male and female washrooms. A second means of egress is located in the south west corner with a fireman's/service elevator. The building is now fully air conditioned, although to achieve this low (8'2") floor to ceiling heights were the trade-off.

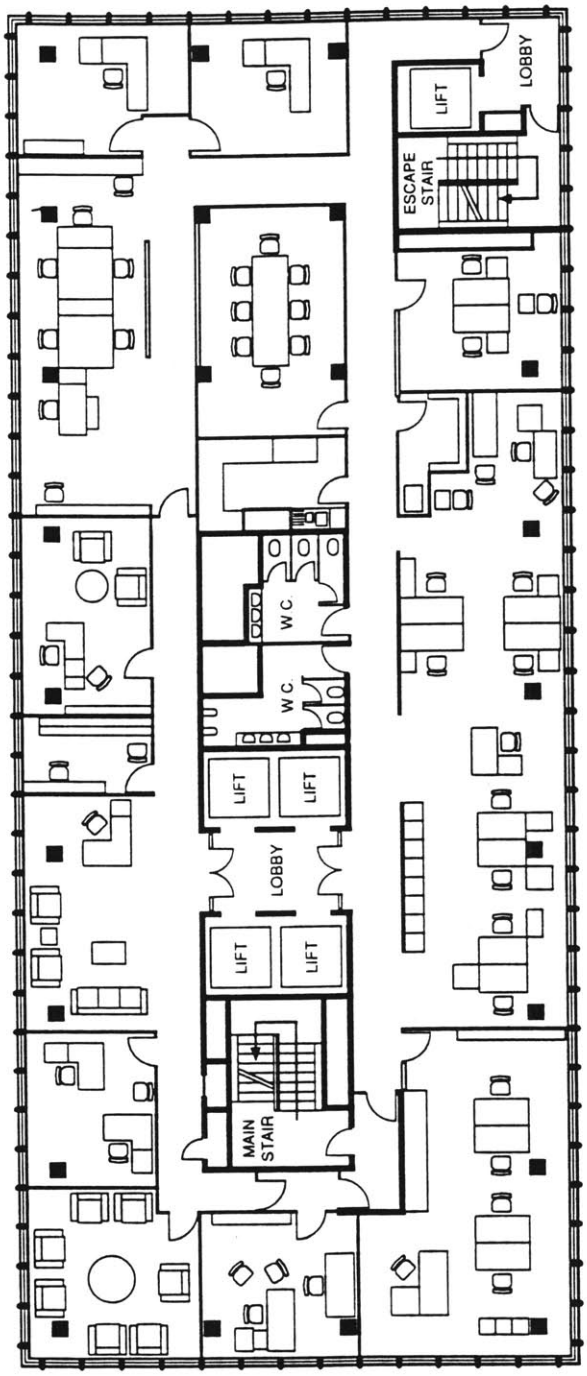
The first and second floor levels have a different configuration and a plan is shown in Appendix H. The floor areas are 12,700 sqft and 14,533 sqft respectively but with limited natural light in the central areas. The individual floors, with their central lobby design can be easily split into single-let and multi-let floors. Both patterns are in use throughout the building and they also can be well adapted to open plan, cellular or mixed layouts.

See the floor plan samples on the following pages.

Typical floor plan to show layout at City Tower



Typical floor plan to show fit out at City Tower



The column spans on either side of the core vary between 19' and 15'. This means that the width from the core to the windows on either side is 17'3" or 21'7". There is only one area which does not comply with the optimum 20' criteria for distance from natural light. This accounts for approximately 12% of the floor space and can well be utilized for conference or storage purposes. However, the deep space is only 8% if a multi-let layout is used, since corridor access to the secondary means of escape takes part of the deep space. The central core layout would not suit every category of user but for tenants not occupying a whole floor it is ideal. The net to gross efficiency is good if single-let, at 80% but falls to 63% if multi-let.

The clear usable floor to ceiling height of between 8' and 8'2" is inadequate by most City standards (8'6" is considered generally acceptable for smaller space) but because the floors are small it seems to have less negative impact than would be expected. In addition, a very low soffit (beam) of approximately 6'8" is above the main entrance from the lobby into the office suites on each floor. This is not very pleasant but does not seem to have adversely affected the success of the building.

One of the rows of columns is less than three feet from the exterior wall of the building, all the way around. This can be a real impediment in fitting out, furniture and wall and ceiling tiles. For this reason the columns are often incorporated where possible into the partitions of a cellular layout. Another problem with the tower is that the window mullions and columns do not line up regularly which creates lay out problems.

Additional floors were gained during the refurbishment when the mid-way service floor was removed and extra space was created where the top level machine rooms had been. These were rearranged and compressed, wherever possible. Early UK towers often had a service floor at the 10th/11th level as elevators and water pumps were unable to service the 20 or so levels.

A4) Leasing and Rents

Despite the restrictions and problems mentioned above, the building has been very successful with smaller tenants, mostly occupying one floor or less. Some however, have expanded over more than one floor. The amount of space tenants occupy varies from 18,000 sqft for Daiwa on three floors to 850 sqft for a small suite on one floor. Daiwa had intended to occupy a large new building further up London Wall but plans to build this property have now been postponed. Since the renovation, the building has been multi-let and intensively managed, along the high service and tenant care philosophy more typical in the US today than the UK.

The image and reputation of the building is good and it is not unusual to find headquarters functions located in the building. Record breaking rents were achieved in City Tower in the 'Big Bang' period, when due to deregulation of the City's financial services in the late 1980's, many foreign banks wished to open in London. Rents over £70 per sqft (£74) were achieved although today open market rental values are in the region of £40 per sqft.

The building, after 1984 was always well let, at over 93% occupancy on average and to high caliber tenants. The building with its' excellent access to elsewhere in the City and transport nodes at the Bank, Liverpool Street and Moorgate filled a niche for a high quality multi--let office tower. Over 25% of the tenants were new to the London market and the tower offers a flexibility to increase or decrease space as and when needed. This last point is important for many companies as it allows a core to exist and expansion or contraction does not become an impossibility.

A5) Leasing today

In 1992, with many of the early leases now rolling over it will be interesting to see if tenants will stay. It would appear that the building is now over rented and as leases expire tenants may not wish to pay the high rents and service charge the landlord wants to see.

The consistently high rents were made on much shorter than normal leases, but the landlord was prepared to trade long term security to boost rents and therefore capital values. Many of the leases also had tenants breaks every five years and therefore the tenants can expect their rents to drop considerably. The landlord says that they are not prepared to offer existing tenants new rents below £47.5, although a new tenant could get space at £40 per sqft. Whether existing tenants will out negotiate the landlord remains to be seen. However, in September 1991 a new tenant took space at £60 per sqft.

The landlord is very reluctant to re negotiate to lower levels because of the major effect on the capital values. If say, income drops from:

130,000 sqft x £65/sqft (avg.) x 93% (occupancy) = £7,858,500
to
130,000 sqft x £40/sqft (avg.) x 80% (occupancy) = £4,160,000

without even adding in the respective costs of empty rates (property taxes) and service charges. If tax is taken into account the income drops to less than £3,900,000 which is a 50% decline. Thus it becomes very apparent why Wates will try not to let existing tenants drop their rents too low. Approximately 45% of Wates income is derived from City Tower so a 50% drop in cash flow has very negative repercussions on share price and cash availability.

Service charges, at £6.5 per sqft are higher than for average air conditioned City buildings[75] but when property taxes (rates) are added in at £20 per sqft the total occupancy costs rise to £66.5 for new tenants and £74 for existing tenants. This is lower than the £100.5 tenants were paying in the late 1980's at the peak of the rental market, but is still very high. It is for this reason that fringe City developments and Canary Wharf for instance were able to take off so successfully. Once

[75]Jones Lang Wootton Papers 'Office Service Charge Analysis (sixth edition)' Table 5, Service Charge by Building Location, for air conditioned, City Buildings. Jones Lang Wootton London 1991 p5.

inner City rents dropped to £30-40 per sqft, the less well located properties were unable to compete successfully as their rental advantage was eroded.

B) Moor House

B1) Introduction

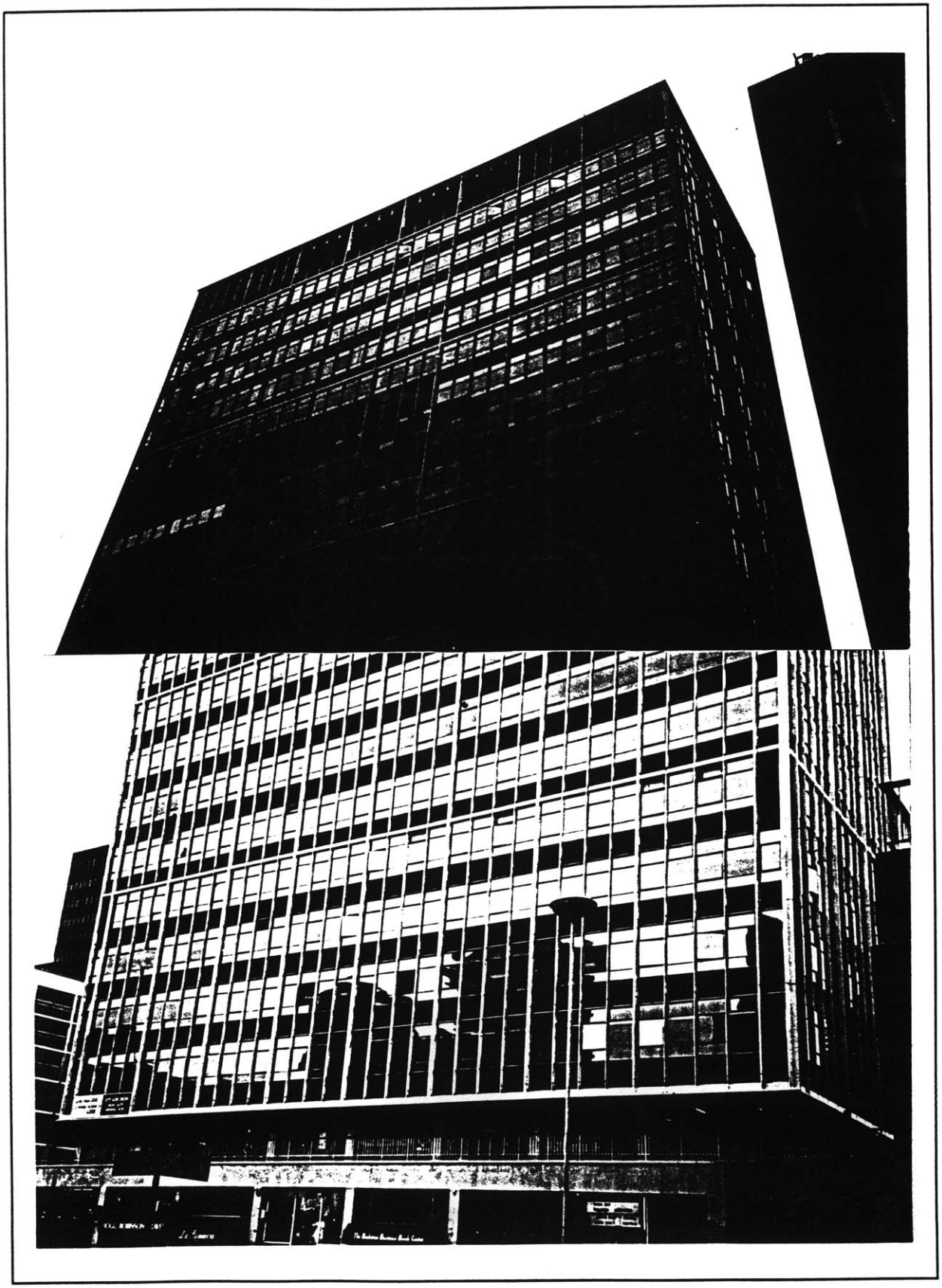
The 17 story Moor House, built in 1960/1961 was due to be demolished and replaced with a larger development, designed by architect Terry Farrell in 1990/1991. Greycoat, the developer, and Scottish Amicable Life Assurance Society postponed the project in 1991 due to the oversupply in the London office market, the falling rental levels and the increased wariness of the funding institutional partner. Since the obsolete but well located building was mainly vacant by that stage, Greycoat had to decide how best to proceed.

B2) Remodeling

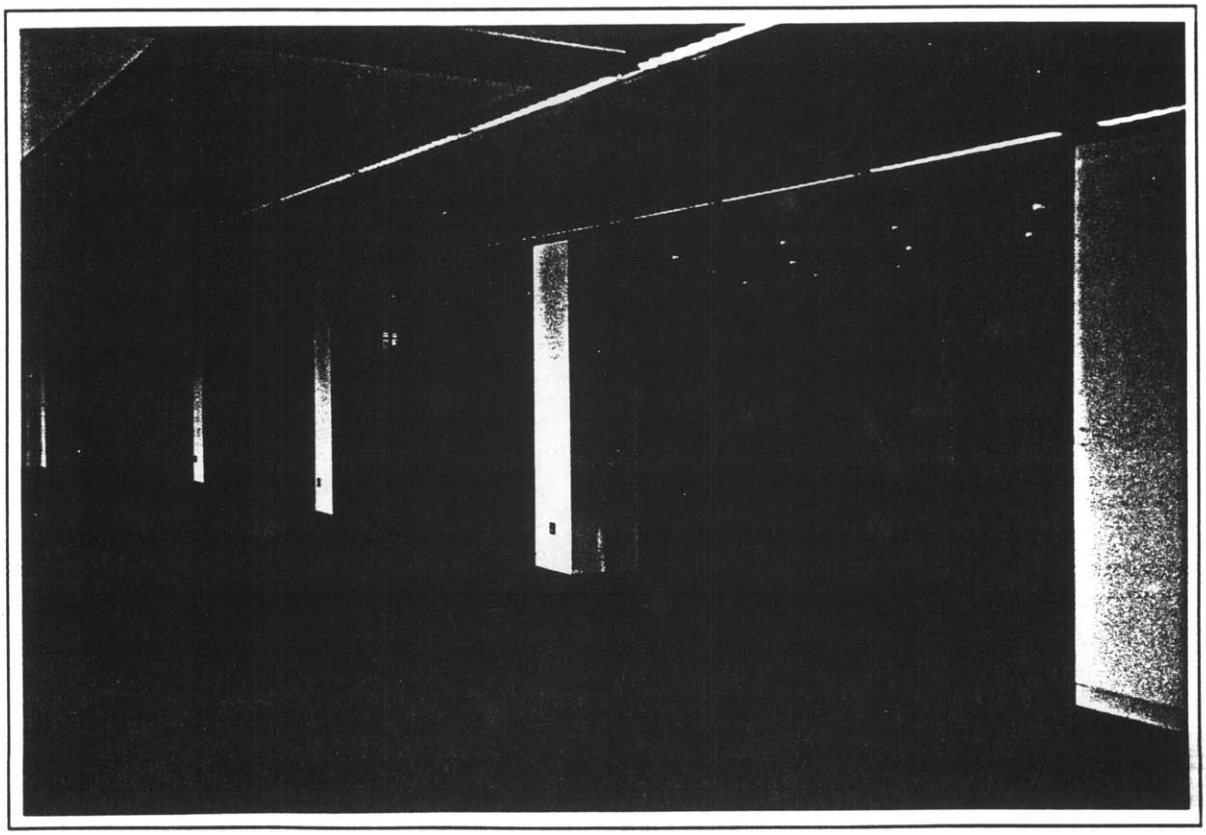
As the market rendered redevelopment as unfeasible, alternative uses such as residential, hotel or storage were not taken up and the option of leaving the property vacant is very expensive. This is due to the necessity of paying half property taxes on vacant space and the need to maintain some security and services. Empty property rates after three months are charged at 50% and therefore to hold a 96,200 sqft building at £7.5 per sqft would add up to over £700,000 a year in tax alone. Demolition could cost up to £1.5 million pounds.

The landlord did not want to loose the possibility of a major longterm rebuild which would put a larger and more efficient building on the site and therefore opted for a low grade, internal only refurbishment. The costs of holding the property vacant or of demolition were both considerable. Perceiving a lack of alternative flexible (in terms of leasing and unit size) cheap multi-let space on the market aimed at the smaller tenant, Greycoat Chairman, Geoffrey Wilson decided to target this niche market. It was decided to remodel the entrance hall and common parts as well as doing cosmetic improvements to the floor space itself.

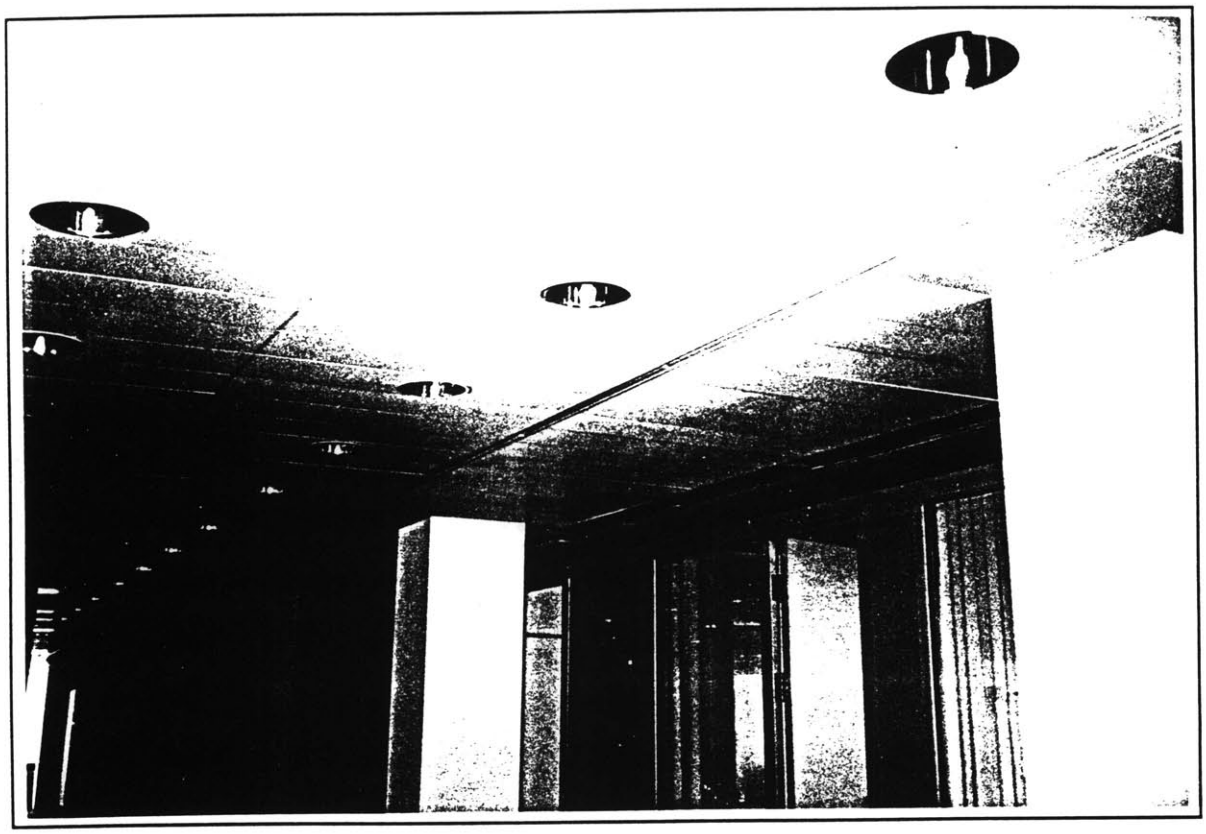
Photographs to show the Exterior of Moor House, London, EC2

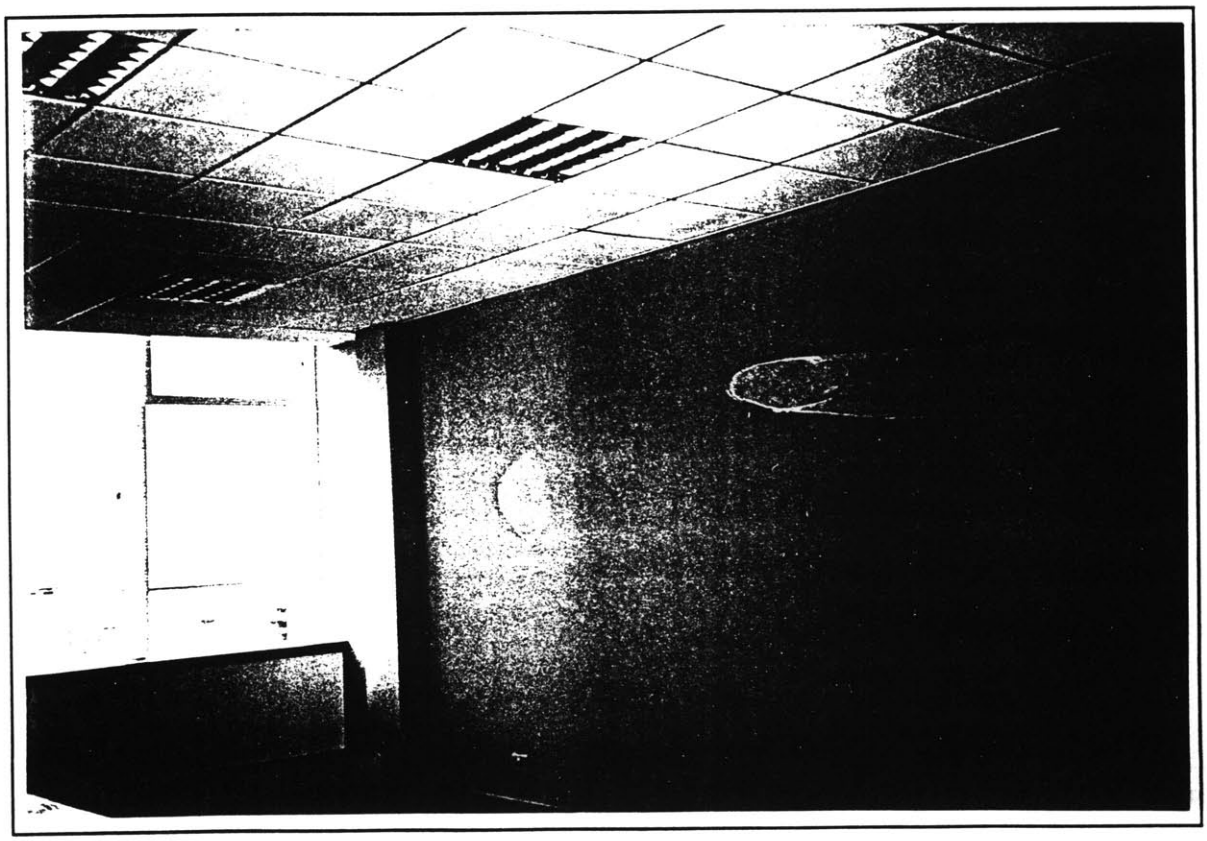


Photographs to show the Unrefurbished Interior of Moor House, London , EC2



Photographs to show the Refurbished Interior of Moor House, London, EC2





B3) Specification

By spending approximately £20 per sqft the landlord was able to refurbish the single story entrance hall with marble and a new reception desk, replace the entrance canopy with a more noticeable and attractive one, refit the lift interiors, and redo the lobbies and bathrooms on each floor. The office space itself has new suspended ceilings, carpets, blinds and paper and paint work. Some of the floors were already individually air conditioned and with raised floors, put in by previous tenants. All of the old radiators have been covered with MDF panels and veneered cherry wood sills and skirting were installed.

The window mullions were cleaned and painted internally and the ironmongery was also cleaned and serviced. The buildings services had been kept in good condition and therefore it is possible to operate the building with the existing lifts, boilers, electrical and plumbing systems. However, the radiators were cleaned and serviced, and new electrical sockets were installed (2 per 16' of wall). In other words, an attractive new veneer or skin has been placed over all of the internal existing outmoded elements of design.

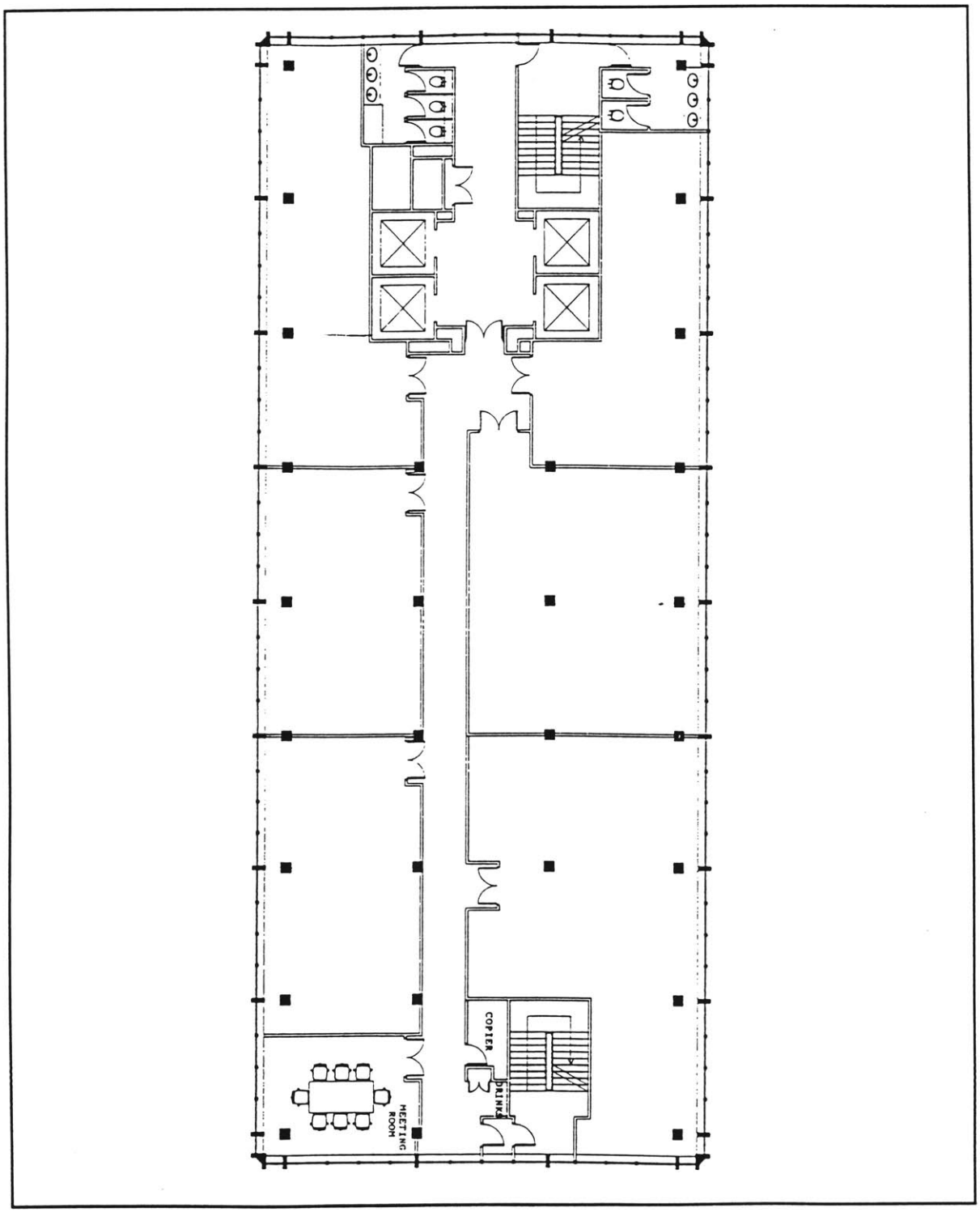
Asbestos did exist and had to be fully removed from the lobby areas with all the necessary sealing precautions. The existing radiators also conceal some asbestos but because it is not disturbed or removed during the refurbishment process, the building inspectors will allow it to remain. It is essential that the asbestos does not come into contact with the heating element. This was one reason for keeping the renovation process simple, as costs escalate once abatement is necessary.

B4) Layout

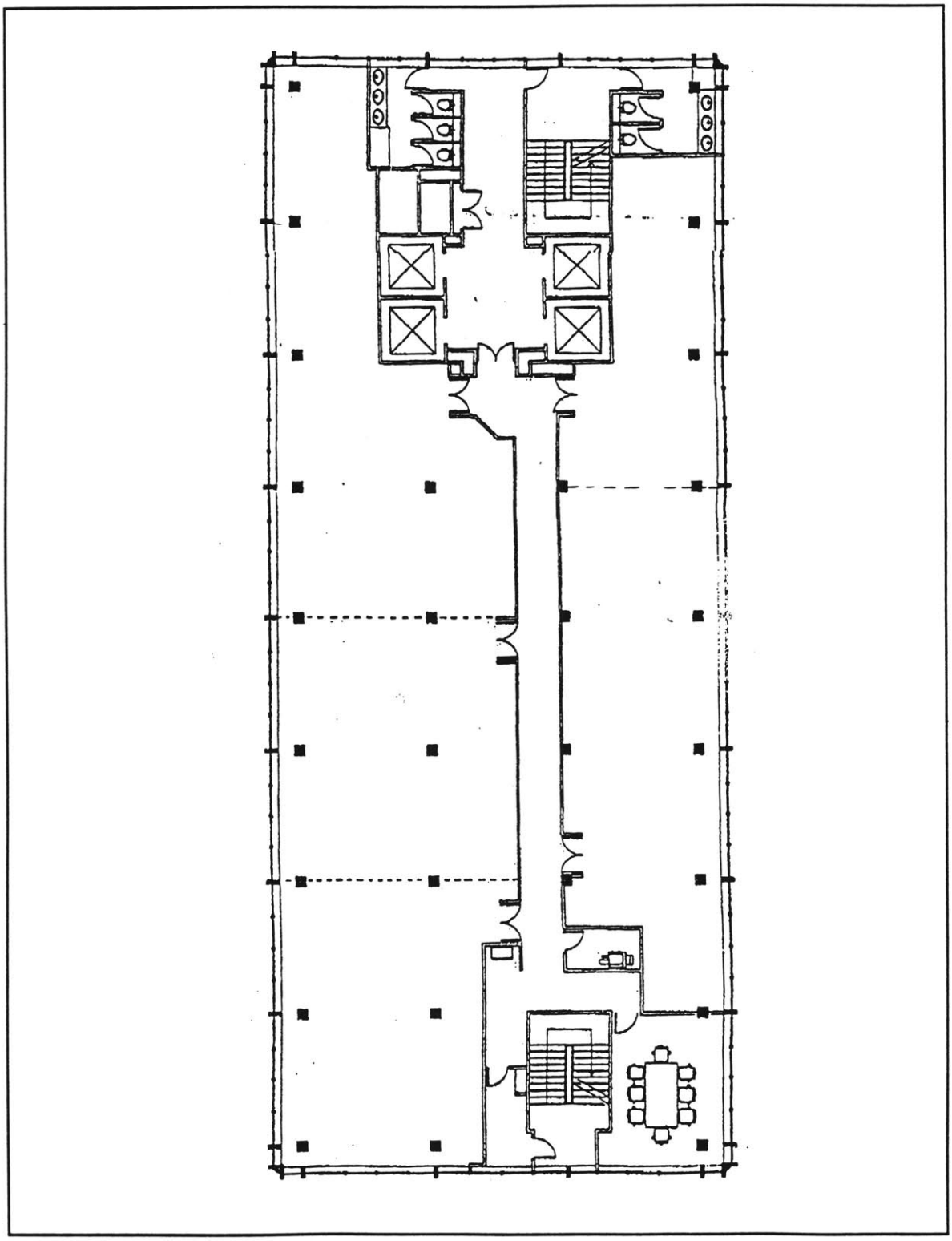
The show space is fully finished, with Greycoat prepared to do the same for any tenant wanting an office. Two floors are currently available as flexible multi-let suites with units ranging from 380

sqft to whole floors of approximately 6,000 sqft. Alternatively, the letting suite has now been leased several times with a tenant wanting to move in immediately. The landlord merely moves onto the next office, carries out the refurbishment and tries again. Typical floor plans are shown on the following pages.

Plan of Typical Floor, Moor House, London, EC2



Plan of Typical Floor, Moor House, London, EC2



The main core of the building is located at the south end, with the secondary means of escape at the north elevation. This leaves clear space (with the exception of the columns) of approximately 53' x 106' = 5,618 sqft. Columns occur at regular 16'3" (5m) intervals (whereas new buildings today in the UK are constructed on a 24'6" (7.5m) grid.) As at City Tower there is also a row of column 3' away from the windows causing layout problems. In this building the mullions line up with the columns. However, the clear space described above has a length of 80' with a depth of over 20' from the windows on either side. In other words, 80' x 24' = 1,920 sqft or 25% of each floor is deep space if the floors are treated as single lets. For multi-let floors, the landlord has put the corridor down the center, linking the individual suites and only 15% of the space turns out to be deep, and this is a much more acceptable ratio, considering every small tenant is likely to need some storage, or reception space anyway. Multi-let net to gross efficiencies of 70% are achieved and when single-let this goes up to 78%.

Three iterations of corridor layout have been tried (see plans below): one which locates the corridor centrally with suites approximately 24' wide on each side. This layout includes an extra set of columns in both sides of the offices, whereas the alternatives only have an additional set on one side. One of the advantages of the central passage is that there is a direct view out of the window at the end which is attractive when coming out of the central lobby and gives a much more pleasant sense of space. This works far better than having the stairwell at the end of the corridor. The other two have the column line along the corridor, creating suites on either side with different depths of 20' and 30' respectively. However, if the corridor is towards the westerly elevation the staircase is at the end of the corridor. If the corridor is closer to the easterly elevation, the offices with the more prestigious City views are smaller and therefore perhaps less attractive, although they would contain less deep space. The sunlight advantages and disadvantages of each side vary in the winter and summer months.

The bathrooms are located to the rear of the main core and there is a male and female set per floor. One set is situated in the south westerly corner and the other directly behind the risers in the core itself. This creates a long narrow area of 35' x 12'6" on the easterly side of the core and this type of space can be difficult to optimally utilize. On the western side of the core, due to the corner location of the toilet block, the space is only 22'6" long which is less of a problem. As mentioned, some sample floor layouts by the renovating architect, Simon Sturgis are shown on the following pages.

Where air conditioning has been installed by the previous tenants, plant rooms behind the core in the narrow space, described above have been utilized. This obviously reduces the efficiency ratios further and trades the best corner views for the awkwardly shaped space. The air conditioning is not centrally controlled, but this previous 'inadequacy' now gives tenants in the building the choice of air conditioned space or not, with the consequent differentials in rent, service charge and property tax, and the control they seek, if they do choose to take the option. The windows all open and so the tenant can have full control over it. Radiators can be turned off individually. Where air conditioning has been added (to approximately 54% of the available space as at May 1992) raised floors were also installed for cabling. Although only 6" high it seems to be adequate for the type and size of tenant who currently occupies Moor House.

The slab to slab height in Moor House is 10'6" and therefore even with a suspended ceiling of 1'6" and a minimal raised floor of 6", 8'6" is still available providing a comfortable head room.

B5) Shared Service Concept

Floors will be split and multi-let for as long as demand exists for this type of space, whilst others are available as a whole. The multi-tenanted levels include a few shared services, including a board room located in the north west corner of each floor, rentable by the hour, as well as a photocopier and drinks machine which operate on 'vendor' cards payable by the unit. There is an

on-site building manager as well as a leasing office run by the developer. The small tenant finds the shared service concept appealing, in that they do not need to provide these expensive facilities themselves but equally do not have to pay the high costs per person of the fully serviced office providers.

B6) Leasing and Rents

The space is currently (Summer 1992) letting well, as mentioned above, with over 30% taken and approximately another 30% under offer. The asking rents are cheap even by City standards today, although there are few directly comparable (multi-let towers) buildings operating at these low rent levels Rents are between £15-20 per sqft depending on whether air conditioned or not. Property taxes are between £15-17.5 per sqft and service charges are low, in the £3.5-4.5 range. The city average for non air conditioned buildings in 1990 was £4.52 and for air conditioned space it was £5.87.[76]. If the tenant negotiates well, the landlord will cap the service charge and therefore total occupation costs can be as low as £33.5-42 (compared with £66.5-76.5 in City Tower).

The landlord is asking for a ten year term with an upward only rent review at the fifth year and without any of the tenants' security provisions in the Landlord and Tenant Act of 1954, (which enable the landlord to redevelop without having to issue statutory new leases or compensation.) The landlord is further asking for a break at the fifth year and on six months notice at anytime after. However, short flexible leases are available if the tenant asks, since the landlord needs cash flow now more than anything else. It is likely that Greycoat will insist on breaks after five years so as to enable redevelopment should they choose to go ahead, but this is unlikely to be a problem to the typical tenant in Moor House.

[76]Jones Lang Wootton Papers 'Office Service Charge Analysis (sixth edition)' Jones Lang Wootton London 1991 p5.

The space at Moor House is appealing to a variety of tenant types from new start-up financial service companies looking for an acceptable and recognizable City address to existing established companies such as the Swiss Canton Bank and the Anglo-Irish Bank.

An interesting example is part of Hoare Govett, the stockbroking firm who are moving out of what is now considered to be one of the best developments in the City, Broadgate, into Moor House. The tenant can fit a 24 person dealing floor and 22 person back up operation into one floor of the building. The grid pattern of 16' is more efficient for this particular operation than the larger 25' grid at Broadgate. No dealer is more than 26' away from an opening window, and many are far closer. At Broadgate, the dealing floors are located in very deep space and the distance to natural light for an individual could be over 70'. The restricted floor to ceiling heights do not seem to be a problem either. They were paying approximately £50 for rent alone plus £35 tax and about £7.5 service charge. Their total savings, assuming they are occupying the same amount of space (whereas they are, in fact consolidating to some extent) are in the range of £300,000 per annum or 55% of current costs.

6150 sqft x (£50 + £35 + £7.5) = £568,000 per annum
As compared to Moor House
6150 sqft x (£20 + £17.5 + £4.5) = £258,300 per annum.

However, it must be said that in the current climate, many firms of brokers have no choice but to reduce overheads as much as possible, even if the new space is not as comfortable. It is interesting that the image of the building is acceptable to this particular tenant.

As indicated, some of the tenants are moving up in the world and others are just entering it. The overall occupation costs are low and with a flexible leasing structure, attractive clean space internally and the continued good address at the junction of London Wall and Moorgate, it is likely the building will be successful in its new form.

B7) Refurbishment analysis

The cost of the fit out for the multi-occupied floors is approximately £20 per sqft or £125,000 per floor. This takes all of the improvements described above into account. Tenants moving into the whole floors negotiate for their improvements but it seems that Greycoat are prepared to spend this per floor.

The cost of a major rebuild in the City is approximately £120 per sqft and a major renovation, including recladding is £90 or 75% of the rebuild. Massive oversupply has meant that rents in the City have dropped so far that a new building today could only achieve £30 or less (if it let at all) whereas a refurbished building such as City Tower, let in parts can command a higher rent. Because a larger building, with a greater net to gross efficiency would be created on the site, the major refurbishment is not feasible but neither is the rebuild option, for the foreseeable future.

However, it seems that the cosmetic refurbishment route may be successful and the landlord could consider the benefits of some further works to improve the external appearance of the entrance and surrounding shops, to help enhance the image of the immediate area. It should be possible to upgrade the landscaping around the entrance, although Greycoat will be reluctant to spend any monies which they feel they may not recover. The London Wall properties have always had identity problems with knowing whether their major entrances should be at podium or street level and this could be a good opportunity to further clarify the street level front door for this building.

C) Winchester House

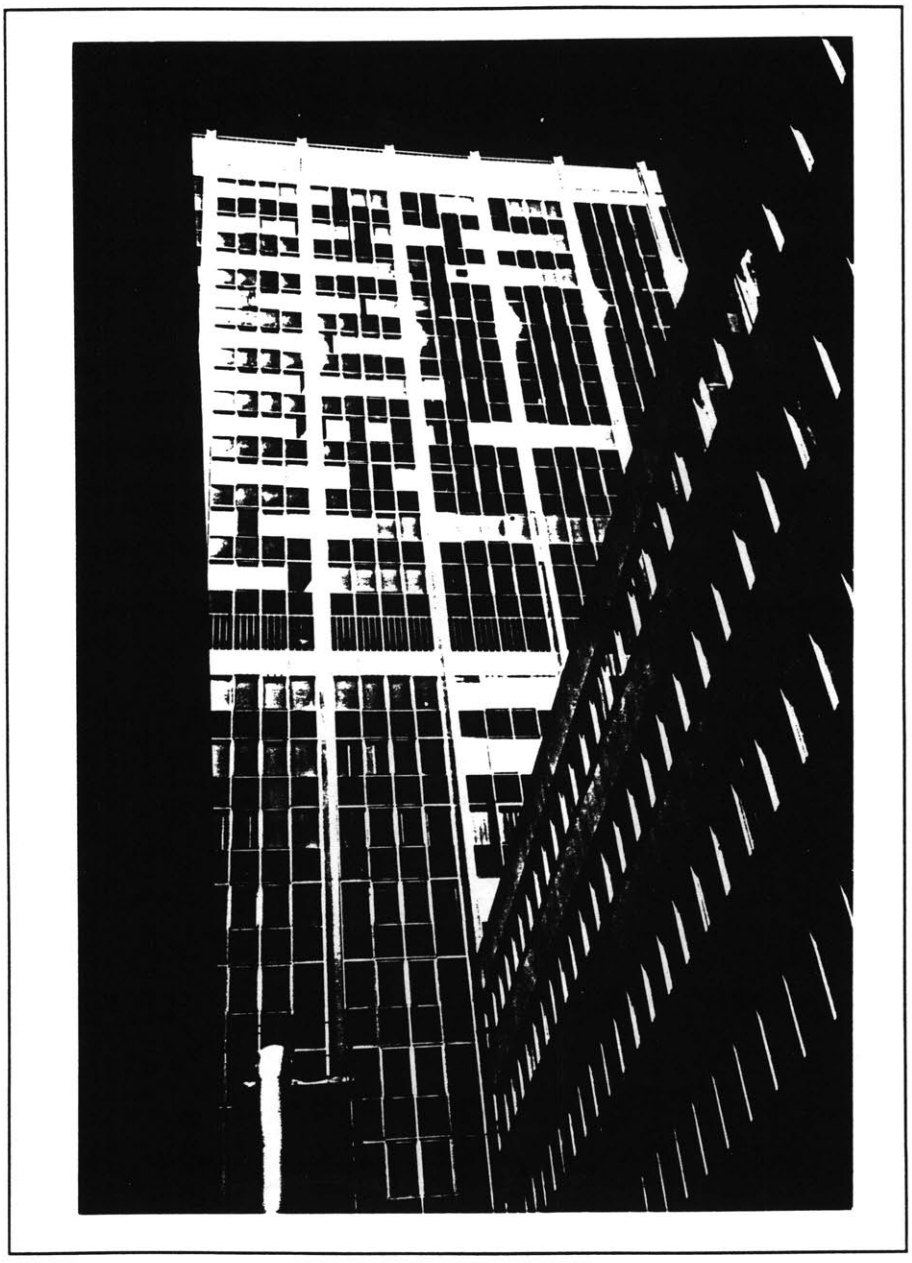
C1) Introduction

The Third building in this case study is Winchester House, on London Wall but not one of the six original towers. It is further east and is part of a more complex arrangement which consists of a 21 floor tower, a 7 story building, a link block, an underground restaurant, theater and car park.

The original developer of the seven story block was in financial troubles during the original construction in 1960 and the adjacent developer took over the site and linked the two buildings together Again this building is considered functionally obsolete and was due to be rebuilt in the early 1990's. As with Moor House, neither the demand for a new property nor the finance to do the project were available and the owner, Wates City, with Friends Provident Life Assurance Fund had to postpone redevelopment.

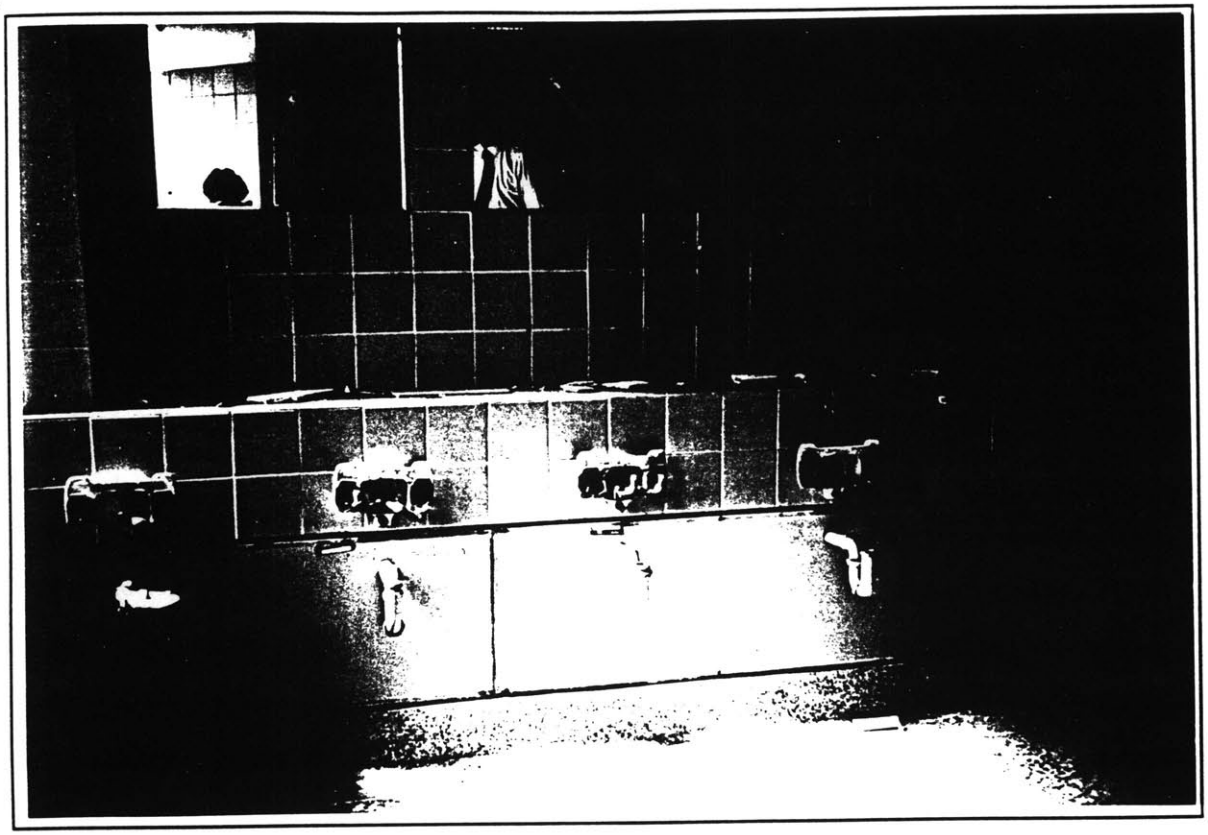
Photographs of Winchester House are shown on the following pages.

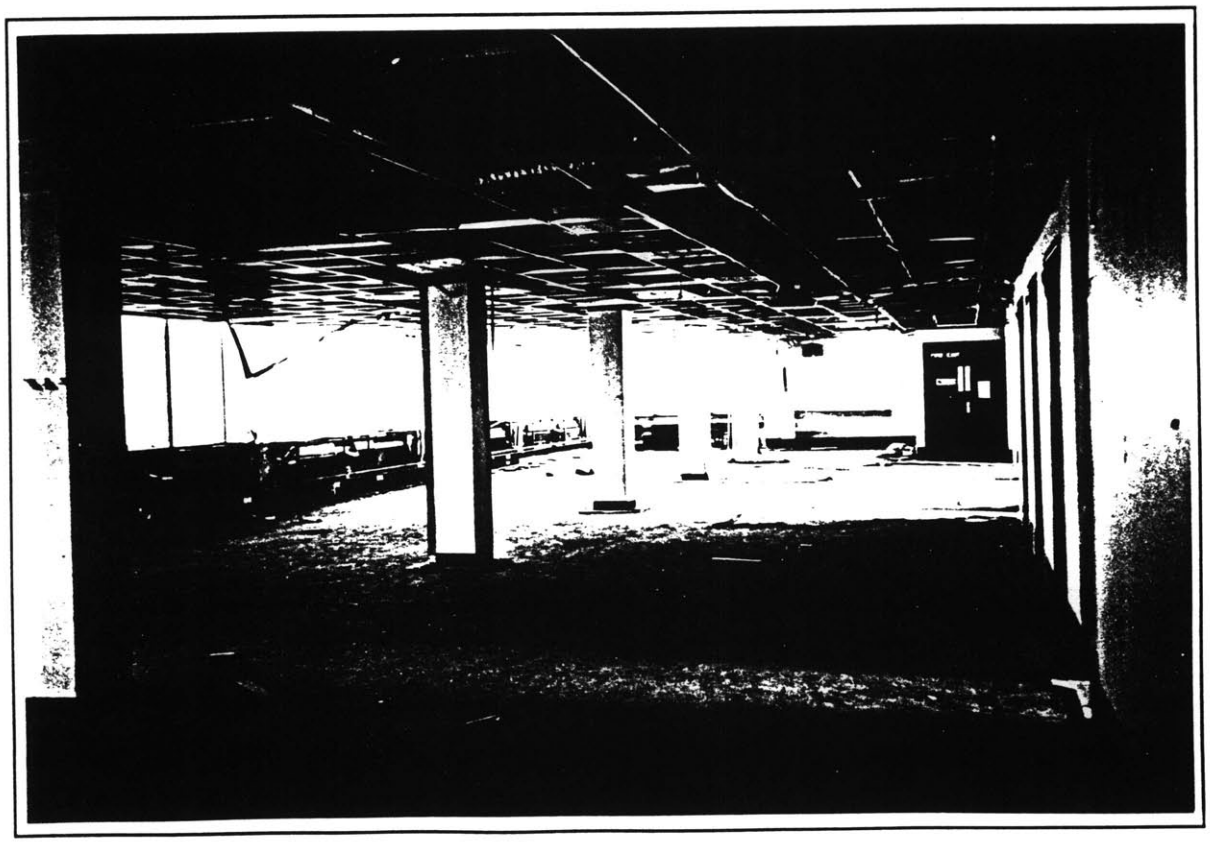
Photograph of the Exterior of Winchester House



Photograph of the Exterior of Winchester House

Photographs of the Stripped Out Interior of Winchester House





C2) Layout

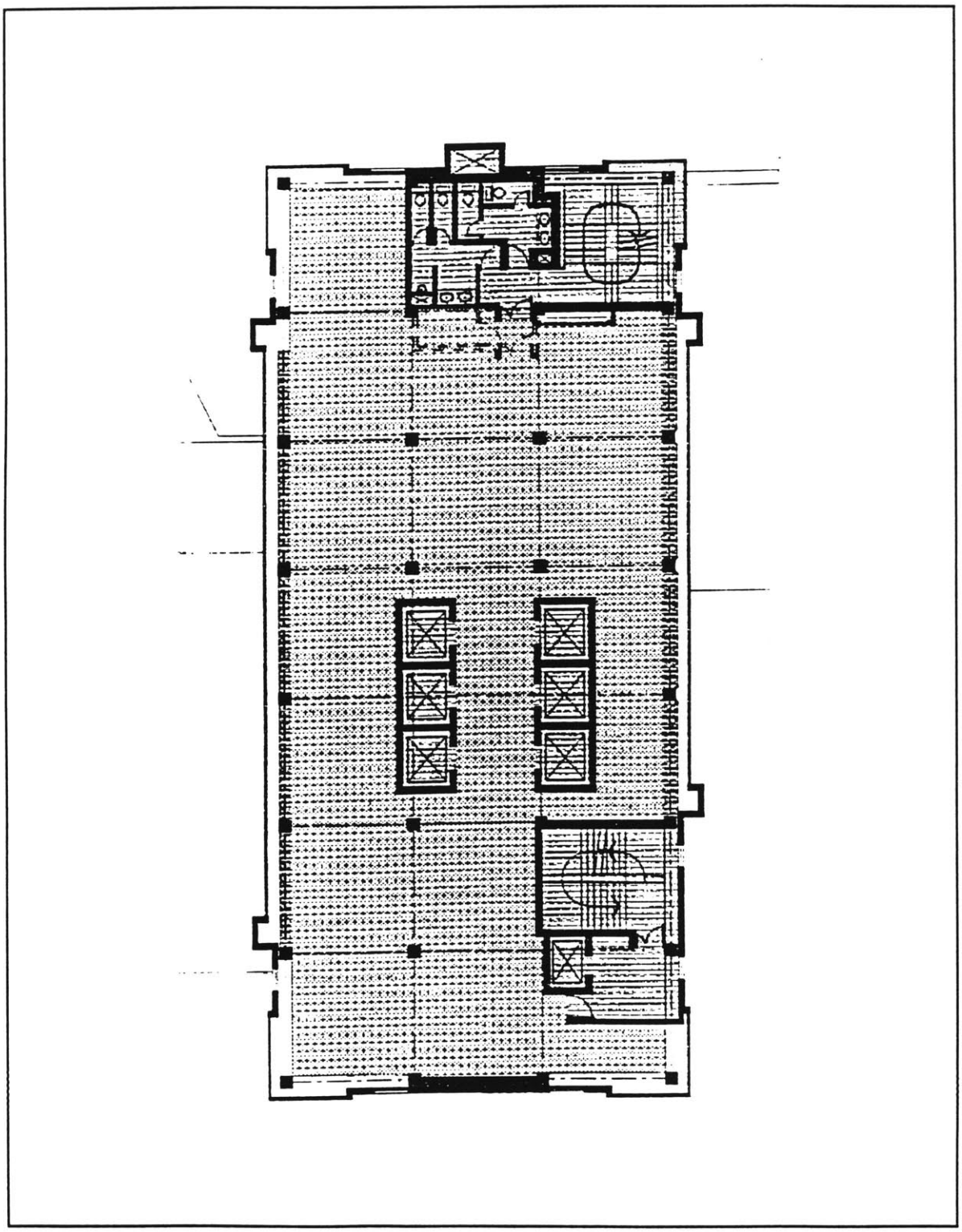
The tower has two elevator banks, each comprising three cars. One whole bank drops off at the 11th floor. Until this point the tower floor plate is very inefficient with only 59% usable if multi-let and 66% usable if single-let, in terms of net to gross efficiency. 12% of the floor space is deep space if single let. At the higher levels of 12-20, 69% is usable if multi-let and 75% if single-let. However, 30% is then deep space and the layout is less attractive to use.

The use of space at the Winchester House complex is far less efficient than the other two case study towers, both in terms of floor plate design and site planning. See the layout plans on the following pages. For these reasons it makes better sense to rebuild than refurbish, to take advantage of the additional floor area that could be created. In addition, many of the building services are in very poor condition and are obsolete. The bland elevations of the buildings present poor facades to London Wall, Great Winchester Street and Broad Street. Nor do they relate to any of the buildings in the vicinity. Floor plans are given on the following page.

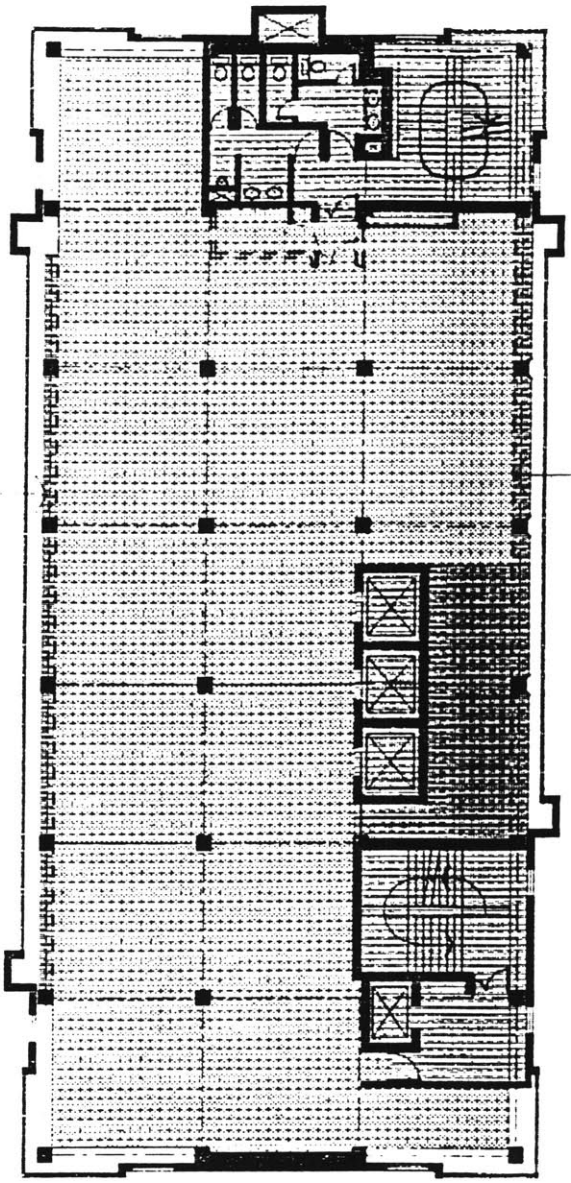
C3) Specification

The building is not air conditioned and although the suspended ceiling accommodates recessed lighting, little space is available for distributing cooled air. No raised floor is possible but the screed has been dug out in channels to allow for some under floor trunking.

Typical Floor Plan for the 1-12 Floors at Winchester House



Typical Floor Plan for the 12-21 Floors at Winchester House



C4) Refurbishment or Stripping Out Floors

At one stage Wates looked to carry out a major refurbishment of the building and sought to maximize value for minimum impact. However, the costs were too large with respect to the advantages gained and the project was abandoned. An increase in the amount of the net floor area was not sought but instead an attempt to improve the image of the complex was attempted, along with improvements to the entrances, frontages and courtyard parking. Floor mounted induction units could be introduced to provide cooling but floor area would be lost in the process. The link block was to have been demolished, arcades and shops introduced to the London Wall frontage and a courtyard developed.

In the end the scheme was abandoned and it was decided to de facto 'mothball' Winchester House as the tenants move out, since it is the landlords' belief that the building is unlettable without major refurbishment, unlike Moor House. The building will not be demolished (with an estimated cost of £3 million[77]) but will have the services stripped out of each floor as it becomes vacant. The Valuation Office have agreed that no vacant property tax need be payable if the whole floors are proved to be totally unusable.[78] In this way, the building will become uninhabitable, although considerable expenditure will have to be made by the landlord to keep the complex running for the few tenants who are still in occupation.

As tenants choose to leave, the available space is put on the leasing market for three months. This is the period during which rates are not payable and if no interest has been shown during this time they are stripped out. This involves removing the floors, ceilings (back to the slabs), radiators,

[77]Figure given during conversation with Tom Williams, Portfolio Manager, Wates City Property Management Ltd. May 1992.

[78]This is reminiscent of the early 1970's when UK industrial property was unlettable and owners were knocking the roofs off warehouses to avoid paying empty rates on buildings they were earning no income from and had no likelihood of doing so in the foreseeable future.

bathroom fittings and capping all the services with concrete and generally making the space appear as demolished as possible.

As at May 1992:

61.6% was stripped out, 28.1% was let, 10.3% was vacant = 100%

C5) Running Costs

The building currently costs £900,000 to run each year since rates have to be paid on partially occupied floors and for vacant areas of basement storage etc. In addition the management costs are only partially recovered from the tenants and do not cover the costs of all the security and services needed to keep the complex operating. Only £435,000 is recovered from the tenants leaving a shortfall of £550,000 to the landlord. This is a real burden on Wates but is preferable to the cost of paying off the remaining tenants who would negotiate to go and the enormous cost of demolition. Wates wish to rebuild as soon as possible and have a stronger preference for a new 'trophy' building than for a refurbishment of Winchester House, which they only purchased in 1987 with the express intention of redevelopment.

C6) Leases and Rents

90% of the leases still in existence are now on six months notice but some of the tenants seem to be mistakenly hoping they will be paid to move out and that the market will recover to the 1987 position.

The building is now 25% occupied and those who are remaining are, for the main part, tenants who were hoping to be paid to leave to allow redevelopment to occur. However, having failed to reach agreement in the late 1980's on the amount of compensation Wates should pay them (at one time the tenants were offered approximately £2.5 million to split between them but were unable to agree) they are still in occupation at higher than market rents. Wates will now not allow any tenant

to break their lease without the appropriate compensation. Wates need the higher than market rents receivable from some of the tenants to cover the costs of operating a large complex that has three main entrances, all of which need to be kept open and manned.

However, a new tenant, a firm of solicitors called Hammond Stoddard, has just taken the 20th floor of the tower, but outside the Landlord and Tenant Act. They are a firm of Bradford (Northern) lawyers who are opening an office in London and the space is even cheaper than in Bradford (not one of the UK's highest rent cities!). Winchester House rents are only £7 per sqft as the space is so poor in quality. The service charge is very high at £7 per sqft since the services are so old they are inefficient and very expensive to run. As elsewhere in the City, the rates are high (£20) and therefore they bring total occupation costs up to £34 per sqft. Compared to £33.5 for non air conditioned space at a refurbished Moor House it is surprising any new tenants wish to occupy at all.

5.3 Summary Tables for the Case Studies

MATRICES FOR THE COMPARISON OF THE THREE CASE STUDY SITES

1) Matrix to show information relating to layout

	City Tower	Moor House	Winchester House
No. of floors	18	16	21
Total size	130,000	96,226	183,936
Floor plate size	6200	6000	4080
Floor dimensions	57' x 142'	53' x 139'	49' x 118'
Location of core	Central	South end	Along center of long North wall
Column width	1' x 1'	1' x 1'	1' x 1'
Grid width	16'	16'	16'
Car parking	Underground	Underground	Surface and Underground
Floor to ceiling ht	8'2"	8'6"	8'3"
Ceiling void	1'4"	1'6"	6"
Raised floor	2"	6"	0"

2) Matrix to show information relating to costs

	City Tower	Moor House	Winchester House
Rent Avg.	£40-50	£15-20	£7
Service charge	£6.5	£3.5-4.5	£7
Rates	£20	£15-17.5	£20
Total occ costs	£66.5-76.5	£33.5-42	£34

3) Matrix to show information relating to Specification

	City Tower	Moor House	Winchester House
Air conditioned	Fully	In part	No
Central Heating	Yes	Yes	Yes
No Elevators	5	4	6
Lobby Height	Double	Single	Single

4) Matrix to show information relating to Age

	City Tower	Moor House	Winchester House
Date Built	1960/61	1960/1961	1961/2
Date Renovated	1983/1984	1992	N/A
Demolition due	N/A	1990/1	1990

5) Matrix to show leasing information

	City Tower	Moor House	Winchester House
% leased	93%	c.60%	25%
Length of lease	Short - 5 years	flexible	6 mths notice
Rent reviews	N/A	N/A	5 yearly

6) Matrix to show information on net to gross ratios and efficiencies

	City Tower	Moor House	Winchester House
Gross Internal Area	7960	7685	5893
Core and Columns	1600	1600	2018
Net Internal Area	6359	6084	3875
Primary Circulation	1289	655	384
Max. Usable Area (GIA-core-prim circ.) if multi-let	5069	5428	3490
Single-let	80%	78%	66% (75%)
Multi-let	63%	70%	59% (69%)
Deep Space (single)	8%	0%	12% (30%) ( ) represents 12-21 levels

5.3 Analysis of Case Studies

From studying the floor plans of the three different buildings it becomes apparent that the Winchester House layout is the least attractive as a working environment and the least efficient, certainly in the lower half of the building. The second bank of elevators which protrudes into the usable office space breaks up the floor if a single tenant is in occupation. If the floor is to be split, one tenant could occupy the north end and another the south, but the space is not really satisfactory due to the fire corridor arrangements that would be needed. The higher levels of Winchester House have 30% of the usable floor space which is further than 20 feet from the natural light. The building is undoubtedly unattractive, outmoded and considerable amounts would have to be spent on the whole complex to achieve even the superficial levels of improvement carried out at Moor House. At £125,000 per floor, Winchester House would require £2.65 million plus the extra for all the landscaping and site areas.

City Tower has been successfully renovated and repositioned but it remains to be seen whether the landlords required high occupancy levels and rental levels of £40-50 per sqft can be sustained or not. The advantage here is that short and flexible leases are on offer. There is an overall 20% vacancy rate in the City of London and this is acting to reduce rents on new properties to very low levels. However, the image, prestige and high service reputation of City Tower may serve to shield the building to some extent. In all respects City Tower is a model of how, at the right time in an under supplied market, a building that had been considered obsolete can be recycled. The small floor plates, attracting specific tenant types who were not interested in vast dealing floors and the 1980's cabling requirements, were adequate for the numerous foreign banks who headquartered in the tower.

Because the floor plates were small and the windows opened, the combination of low ceilings and only adequate air conditioning were never major issues in slowing down the leasing of this highly successful project. It is really interesting that the highest rents ever achieved in the City of London

(and at that time -1987- London office rents were competing with Tokyo to be the most expensive in the world) were in a 1960 office tower with average floor plates of 6,200 sqft and a second rate air conditioning system. The cost of the renovation was high but the project was highly successful for Wates and has been used as a model for how to run a high service multi-let tower in the UK.

The question that needs to be asked is whether any of the three case study sites are intelligent enough for users to successfully occupy them with the new demands of the next decade and whether they fit any of the criteria of intelligent buildings as set out in Chapter 4. It seems that Winchester House has too inefficient a layout and floor configuration and that the energy and site inefficiencies make the service charge too high to be competitive. The current buildings are also very unattractive and would need considerable expenditure to become any more appealing. This is in direct contrast to the floor plate at Moor House which seems to be very adaptable either for single or multi-tenanted use. The location is excellent for transport, retail and amenities (Barbican, Tube stations, new Marks and Spencers' food store etc.) and the price point will bring new tenants into the building. The issue must be whether the owner can break even or not at rents of £15-20 and the likelihood is that Greycoat overpaid for the site in the late 1980's when it had potential to be redeveloped, as a larger new building and produce rents in the region of £50 and upwards.

The combination of larger site area, smaller floor plan, low floor to ceiling heights and less efficient core layout make Winchester House unrecyclable. However, other 1960's buildings have been successfully renovated recently including British Lands' 1960's 338 Euston Road in the West End of London. Space with only 8'2" clear has been created with air conditioning and raised floors. Extensions of 4'6" wide prefabricated floor trays with concrete topping were added to each flank wall and bracketed to the columns. Many of the buildings new services were then run up the exterior as well as a new cladding being added. Physically, Winchester House could also be renovated but mothballing is the decision that involves least risk and expense.

Moor House is an expensive project with minimum refurbishing costs of £125,000 x 14 = £1.75 million (assuming two floors retain their existing tenants and do not require work). One advantage of the refurbishment method at Moor House is that it is partially phased and therefore the landlord does not need to make large (in this market) capital outlays at one time. The bathrooms and common parts were remodeled out at the start but the floors are being done on an 'as and when' basis to help with finance. It is a good market to obtain favorable construction rates. If an average rent of £15 is used (taking rent free periods into account) on say 12 floors, assuming a very positive 75% occupancy:

6,000 sqft x £15 x 12 = £1,000,000 per annum
and then the landlord would be paying property tax as well as service as charge on 30% of the building
6,000 sqft x £10 x 5 = £300,000
6,000 sqft x £3.5 x 5 = £105,000
Total income = £1,000,000 - £300,000 - £105,000 = £595,000 per annum

With these figures, the landlord is clearing £595,000 and with a realistic capitalization rate of say 10% the building has a value, based on its' current income, in the region of £6 million less the costs of £1.75 million = £4.25 m. This is considerably below the site value appraisal on which Greycoat would have assumed the property to be worth. It could be said that this is not realistic because in time a higher occupancy would be achieved, but it seems that this may not be the case considering so much alternative space is available. A worst case scenario is being shown here. A traditional 'back of the envelope' site appraisal for a redevelopment would assume, say a:

300,000 sqft building would be built on the site at £125 per sqft cost = £37.5 m. Assume this to be multiplied by 1.5 x to account for financing, developers' profit etc. = £56.25 m.
Say net lettable sqft were 250,000 x $30 per sqft = £7.5 m. (Very conservative rents)
Say cap rate of 8%, the capital value is the region of £93.75 m.
The residual land value i.e. the capital value less the construction costs is £17.5 m.

In other words, the value of Moor House is not what can be produced by its' income today but by its' redevelopment potential. However, this is impossible to prove, and does not exist in the current market but does show why the landlord will still want to wait to redevelop, even if the building were 100% let at current rents. (The current value of the building if fully let and guaranteed to

stay so may increase to £12.5 m but this would be a highly unlikely scenario. There would still be a large differential between the rebuild and 'as is' values, although the potentials for future growth would be reflected in the different yields applied.) The opportunity for Moor House, as a refurbishment situation only really exists whilst the land values remain low, even though it may be that this is the case for some considerable time. In other words, it is highly likely this site will ultimately be redeveloped, even though it has the potential to be a recycled, successful building. Therefore Moor Houses' future will depend on the recovery of the London office market. If the market does not recover for some 10 years (and many forecasters are predicting the current oversupply will last at least for 8 years or so) and the changes referred to in Chapters 3 and 4 do develop, then there is a strong possibility that the current Moor House will survive until the market really shows signs of a true recovery or a prelet is obtained. The building will be recycled in the short / medium term until redevelopment especially if the image of the building could be improved, or if image becomes less important.

It is likely that some of the City Tower tenants may wish to move into Moor House but that the products are sufficiently different that there is room for both multi-let towers so close to one another. There seems little doubt that City Tower has been successfully recycled, that Moor House is in the process of successfully filling a niche and is likely to also be a good model for recycling. Andrew Baums' theory that floor plan layout is important in determining obsolescence seems to bear out in these three instances. The layout in Winchester House seems to be paramount in deciding that the building is not recyclable. All three buildings are approximately the same age and two, Winchester House and City Tower are limited by the same floor to ceiling heights. However, it is clear that these factors will become less important in the next decade as wireless technology reduces the need for raised floors. If this is the case, then Moor House and City Tower will continue being able to be of use whereas Winchester House is currently obsolete and will remain in that category. Neither age nor appearance seem to be major factors in deciding obsolescence.

With enough money put into Winchester House it too would probably be recyclable but with the problems of floor layout, site expenses and current state of the development it is unfeasible. Therefore it seems from the case studies that some models of 1960's towers are recyclable whist others are obsolete.

CHAPTER 6

CONCLUSION

6.0 Critical Issues

6.1 Issues for further research

CHAPTER 6

CONCLUSION

6.0 Recycling Possibilities

There are examples of 1960's office buildings in the City of London and elsewhere that have been successfully renovated, refurbished, repositioned and recycled. Many others have been demolished to make way for the vast expansion of the City which took place between 1987-1992. Yet more were scheduled to have been rebuilt, at far greater plot ratios and with new supposed 'state of the art' offices. Some of these, including the case study sites are in locations that have become, over the last 30 years much better addresses, due to the outward spread of the City.

In the recessionary early 1990's, it is this last category of real estate that provides the interest and perhaps opportunity not previously appreciated or realized. An 18-20% oversupply of space in the City will, at current predictions last another 8-10 years[79]. The financially weakened state of the banks and property companies/developers have ensured that the major redevelopments of several 1960's sites has been put on indefinite hold.

As shown, many 1960's towers had problems of quality and it is probably true to say that if major structural faults existed in a property it would be unfeasible to carry out large scale renovation, in any speculative situation. The cost of recladding a tower is also high. The Gulf and Western Building in Chicago will cost four times the original cost of the building just to reclad. The Prudential Building in Boston was considered unfeasible to reclad during the 1992 refurbishment.

[79]Prediction from discussions with Robin Broadhurst of Jones Lang Wootton, London 1992.

Depending on the extent to which a building is refurbished, the external appearance can play an important part in determining a space's acceptability[80]. If the tenant is not primarily concerned with externals and will accept only a refurbished interior such as at Moor House, then a potential market exists.

However, recladding is an excellent way of shedding the old obsolete image of a property such as at British Lands' refurbishment and repositioning of a typical office tower in the West End of London in 1991, known as 338 Euston Road. Image is one of the two main issues when dealing with 1960's buildings since the floor layouts appear to be usable and attractive, in many circumstances. Good urban design around the buildings in question would be very productive in helping to improve the immediate environment. New landscaping, for instance around Moor House would be very effective. Image may become less important to tenants as the 1990's continue and those tenants to whom it is very important will choose to locate in newer space.

> "By the early 1990's it has become apparent that the luxurious workplace, which resulted from this process.....(of higher rents and therefore capital values being achieved through better designed buildings[81])....., seems to have had its day. In most cases it is not viable to build new buildings on inner city sites. All existing fabric should be considered of value.....Once again, innovative techniques for servicing the 'office box' are required" S Harris[82]

It becomes clear that a different (lower) specification than was required in the 1980's is acceptable for many tenants in the 1990's and possibly beyond. The most obvious problem with 1960's buildings is floor height and this stops being a problem once air conditioning is rejected or only installed on a very local basis. This becomes possible with the move in Europe for non air

[80]Wilson S Premises of Excellence - How Successful Companies Manage their Offices A study sponsored by Herman Miller London 1985.

[81]This is the authors' (Lucy Benjamin) interpretation of Simon Harris' paper.

[82]Harris S 'The Ever Evolving Office Box' City Changes Ed. Burdett R The Architectural Foundation London 1992 p15.

conditioned buildings and with the introduction of the technology advances in portable and wireless computing which produce less heat.

Flexibility is the most important feature in deciding whether space is recyclable or not and buildings will be preferred if they are flexible in terms of configuration, internal specification and external appearance. Building flexibility is the key to reducing the importance of incurable depreciation and hence to reducing the owners' risk of holding a property investment. The concept of the intelligent building today is one which provides flexibility for the future changes an occupier may require to incorporate and the issue is, can the 1960's office blocks under discussion provide the flexible space needed in the future, having failed to do so in the 1980's and early 1990's?

Smaller groups of people may be operating out of central headquarters for the majority of the time with other groups of teleworkers and officeless workers joining them at the central location for certain functions. Therefore it seems possible that the combination of changes in office computer technology, work patterns and acceptable building environments will encourage the re-use of some well located and well laid out older office towers.

Flexibility of lease terms is another issue which is beginning to be addressed by the London letting market, but it seems inevitable that the security of the 25 year lease is starting to be over, and a much more flexible short term system will be introduced in its' place, following a US model. There seems few real reasons that the existing 1960's towers should not be a part of a new leasing environment, especially for the smaller tenants who wish to locate centrally but need to keep costs down.

According to Andrew Baum's[83] thesis, the layout of a 1960's building floor plate is important in determining it's degree of obsolescence. The buildings that have been used as case studies all have different configurations and it does seem as if the actual configuration of the floor plan is a very important factor in deciding whether the property is obsolete or not. Moor House and City Tower have very different configurations (see plans in Chapter 4) but both appear to be relatively successful. Less so is the layout at Winchester House, which only achieves net to gross efficiencies of 66% if single-let and 59% if the floors were to be multi-let (in the worst case lower half of the building). However, the layout of the floor plates does not seem dissimilar to that of 338 Euston Road (See Appendix I), although it would be fair to say that no space in that new building has as yet leased.

Much of the construction in London during the 1980's showed little improvement in responding to the urban context and human scale, although the modern office blocks made superficial reference to the humanistic tenets of 'Post Modernism'. Their focus on facadism ignored the interaction with city streets and the urban scale of London. The inappropriately large buildings which resulted did no more to improve the streetscape than the 1960's blocks which at least were less intimidating and dominating. Alban Gate is an example of an oppressively large design which was allowed as part of the City's desperate attempt to compete with other growing areas of London and especially the Docklands. It may be that the poor 1960's buildings compete favorably with the awful 1980's designs, at least externally. Less damage to the human context seemed to occur during the earlier period, at least.

However, property companies have in many places paid high prices for the development sites, including the 1960's buildings on them, that they can only recoup their investments by rebuilding, in the long run. The costs of just running Winchester House show a £500,000 per annum deficit

[83]Baum A Obsolescence and Depreciation of Commercial Property. Routledge London 1991.

The decision not to invest any thing today beyond the holding costs is a reflection of the belief that only a substantial rebuild will provide a satisfactory return. The investment in refurbishment would be large at Winchester House, since so much reconfiguration of the common parts is needed and the tower floor layout is less conducive to multi-letting and therefore has a more limited market. This may be a model that will not succeed in the refurbishment market due to the overheads of operating the whole site rather than just a single building and because the floor plate layout is obsolete. In this instance, it would be more advisable to 'sit out' the current recession by means of the current program of taking the floors out of rating and minimizing costs. In addition, the preference of the landlord not to refurbish has to be taken into account.

Moor House was a much simpler model to deal with and the apparent early success of the Moor House model and the proven success of City Tower show that tenants can successfully occupy the floor plates of the 1960's developments. The buildings have the opportunity to become popular if recycled as they provide cheap space, good address, clear identity if the tenant occupies a whole floor, generous window provision with views and shared services. Almost every major UK city has it's share of these buildings, centrally located and partially vacant. It seems that with some investment into more attractive common parts, shared tenant services and good marketing to small tenants unlikely or unwilling to occupy the more glitzy and expensive new space in the cities, then these buildings too may have a future as well run, multi-tenanted facilities.

Salomon Brothers in London use their Director of Real Property, Andrew Rabinick, an architect, to look at the rehabilitation and retrofitting costs of investment portfolios of property that includes 1960's buildings. They have developed various formulas to aid the appraisals depending on age, location, who the architect and developer were, what materials were used for specific functions etc. This allows them to make fast reasoned judgments at what expenditure is necessary to recycle the

buildings. As more and more money in the construction industry is spent on refurbishment and not new build, such a methodology will become increasingly valuable.[84]

Management will need to move into a more US pro-active mode and provide better services but with the pressure to make existing assets perform owners will have every incentive to attempt to do this. Most important will be to remember that, during the 1990's at least, the tenant will be the king and will demand more for his money.

It may be that legislation in Europe will push these trends forwards but it does seem that increasing numbers of companies will be able to satisfactorily occupy space designed twenty five years before the personal computer ever achieved its dominant position in the business world of the 1980's and 1990's. This is a fact which the landlords of the well located 1960's office towers should take note of and play to their advantage. Even if the sites are eventually rebuilt there is a seven to ten year supply surplus and credit squeeze which will prevent large scale downtown redevelopment. It is during this period that the chance of gaining competitive advantage should be taken, in the hope of being able to exploit a gap in the market for cheap, internally attractive, centrally located and technologically capable space in recycled 1960's tower office buildings.

6.1 Issues for Further Research

- 1960's center city towers should be analyzed to ascertain whether they are located in the same relationship to the center as the case studies. Over time it is likely their relative

[84]Information from discussion with Harvey Bryan of the GSD, Harvard University, 1992.

location would have improved and a model for ascertaining whether they too are obsolete or not could be created.

- It may be that some further education in US management techniques is needed in the UK property profession. As leases become shorter and competition greater, the owners of the newly refurbished facilities will need to invest more in management training and services to satisfy increasing tenant requirements.

- The importance of providing a better quality urban environment during the next decade must be understood. This can only be achieved by owners understanding better the importance of urban design and the benefits this will have on the whole environment. Each building must be considered as the responsibility of the owner, in its context, especially if the owner wants to see income produced in recessionary times.

- In the Spring of 1992 there was a call by the deputy chairman of Barclays Bank, Andrew Buxton for the Office of Fair Trading and the Monopolies and Mergers Commission to investigate the standard 25 year lease. This will become an issue the UK funding institutions and owners of real estate must come to terms with and provide increasingly flexible options for the shrinking tenant base of the next decade.

- Implementation of refurbishment schemes: Analysis of the cost and scheduling of the towers requires models to be created.[85]

[85]Gennari J Phased Repositioning of a 1960's Conference Center MIT Masters Thesis 1992.

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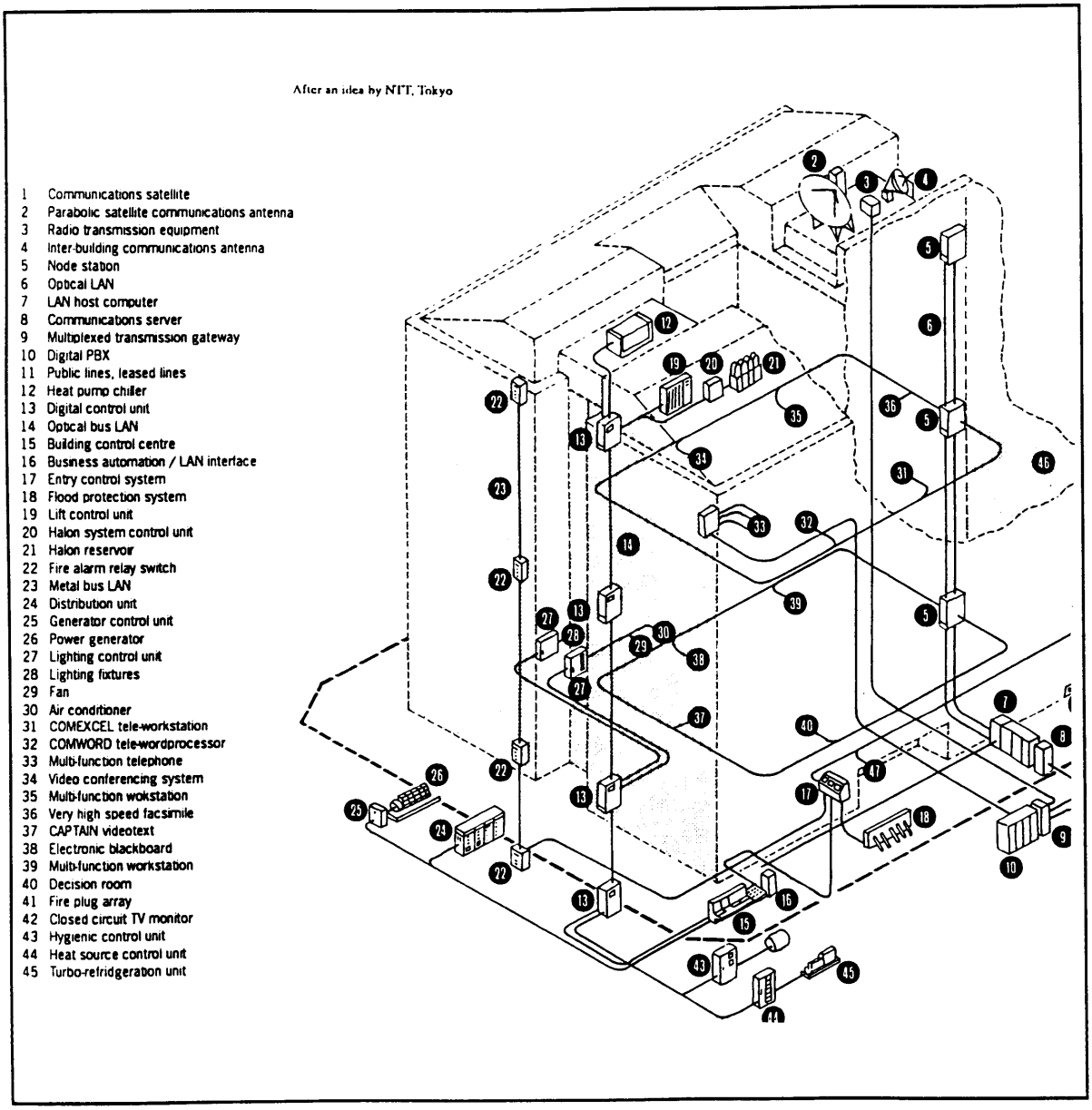
APPENDIX A

The Building as an Extension of the Computer

The Building as an Extension of the Computer.

The diagram is taken from 'The Changing City'[86] by Francis Duffy and Alex Henney, after an idea by NTT, Tokyo.



[86]Duffy F The Changing City Bulstrode Press London 1989 p32.

APPENDIX B

An Explanation of the Hedonic Methodology

APPENDIX B

AN EXPLANATION OF THE HEDONIC METHODOLOGY

Khalid writes that it has been shown that hedonic pricing technique can be used to measure and analyze the financial impact caused by the better attributes of a building specification and design. Khalid then uses this technique to estimate the hedonic (proxy) prices[87] of intrinsic and extrinsic attributes of obsolescence in commercial office buildings. An intrinsic attribute is an internal variable that changes the level of different rents between buildings, e.g. net rentable floor area and an extrinsic attribute is an external variable that affects rents such as location. He says that obsolescence cannot be measured purely by the rent of a building because it is altered by inflation and supply and demand over time. Therefore, to avoid these effects, rental difference is used. The rental difference between the highest rental value of buildings in the office market and the rental value of an office building, is used as a proxy to the financial impact of obsolescence.

One definition of obsolescence is a decline or loss of utility in a building[88]. Additional capital expenditure is needed to maintain the utility of the building or to increase its rental value, including modernization, upgrading of components etc. A more structured approach in predicting the impact of obsolescence would result in better planning of a buildings life cycle. Therefore, there is a clear need to understand what elements have most impact in causing a buildings' obsolescence.

The hedonic methodology takes variables of building obsolescence suggested by the various studies of obsolescence and attempts to prioritize their contribution to the financial impact of obsolescence.

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[87]Hedonic Approach: In an attempt to control for the specific characteristics of individual attributes, a hedonic estimate is used to quantify the 'implicit' value of the attributes of obsolescence. The hedonic equation allows a 'typical' index of attributes to be compiled in 'average' buildings. This explanation is taken from a CRE / MIT Real Estate Economics exercize on effective office rents, authored by Robert Jenkens, '92. The reference for the note was Wheaton & Torto Office Rent indices and their behaviour over time 1992.

[88]Khalid G quotes Baxter W T Depreciation Sweet & Maxwell London 1971.

A study has not yet been carried out in the City of London to prioritize the variables (and the problem is who fills in the questionnaires and with what bias). However, Khalids' study in Kuala Lumpur, Malaysia shows the impact is mainly due to the attributes of appearance, followed by flexibility and quality of building engineering services, which is significant only in the first 15 years after completion. The findings will be very useful for decision making in building design in the future and for valuation and appraisal. It would also be possible to study the impact of obsolescence caused by external, uncontrollable factors such as inflation and changes in supply and demand. This will also help to predict the impact of the different factors.

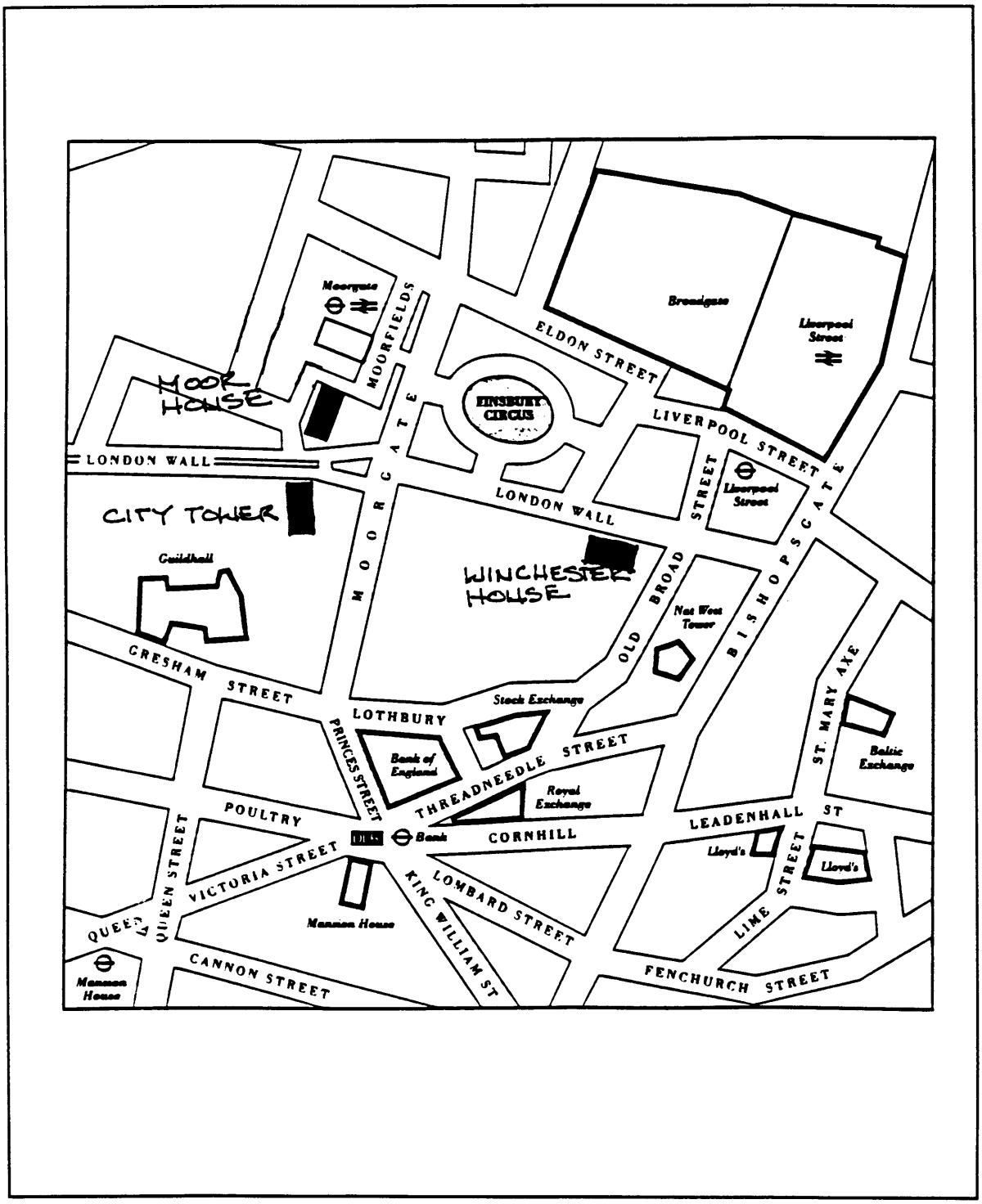
APPENDIX C

Map of the City to show London Wall

(Previously known as 'Route 11')

Map of the City to show London Wall

and the Location of the Three Case Study Sites



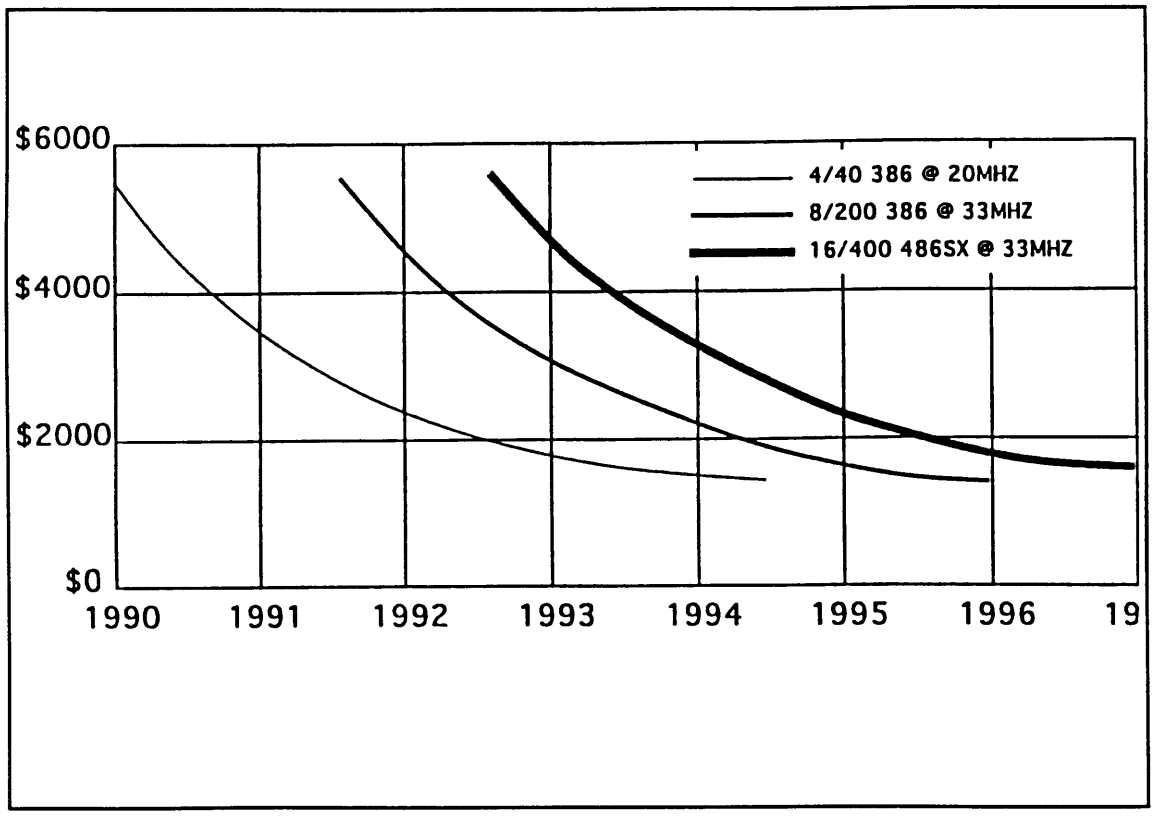
APPENDIX D

Graph to show

'Startling PC Price/Performance Growth'

Graph to show 'startling PC Price/Performance Growth'

Taken from a presentation 'Intellectual Capital and Information Technology' by Franklin Davis at the Symposium on the Construction Industry in the NorthEast: Opportunities for the 21st Century.[89]



[89]Davis F 'Intellectural Capital and Information Technology' Symposium on the Construction Industry in the NorthEast: Opportunitites for the 21st Century CCRE MIT 1992.

APPENDIX E

Further Explanation of the Triple I Organization

APPENDIX E

FURTHER INFORMATION ON THE TRIPLE I ORGANIZATION

Quality is the watchword of many organizations today and should not be seen as a gimmick because in a competitive world, organizations will only survive if they provide consistent quality services or goods. Profit is now seen as the means and not the end in itself. Quality can only be achieved by an attitude of mind, but Deming[90] is now a world guru, forty years after he first introduced the concepts. However, to achieve quality the right people, equipment and environment are necessary. In the Triple I organizations everyone is paid to think and do and it is because they have come to terms with what it takes to sustain a competitive advantage. In the age of the smart machine, the smart organization recognizes the need for smart people. And the smart organizations see the computers and their machines as aids to the smart people. It is vital to understand the difference between automating and informating, as set out by Shoshana Zuboff in her book, 'In the Age of the Smart Machine'[91].

Automating concentrates on the smart machine and cuts out or reduces the need for people. Informating organizations use smart machines, but in relationships with smart people. Informating pays off in the long run, although not in the short term because the organization's thinking or "intellective" capacity has been increased. In the future organizations will have to do three things to stay competitive:

1. Invest more in smart machines
2. Increase the use of skilled people to get the most out of the machines
3. Need to pay those people more and therefore, if possible have fewer of them.

Pressure will be put on the core and Handy has a formula of 'half the people, paid twice as much, working three times as effectively.' The smart organization will need to equip its people with all

[90]Deming W E Out of the Crisis Cambridge University Press Cambridge 1986.
[91]Zuboff S In the Age of the Smart Machine Basic Books 1988.

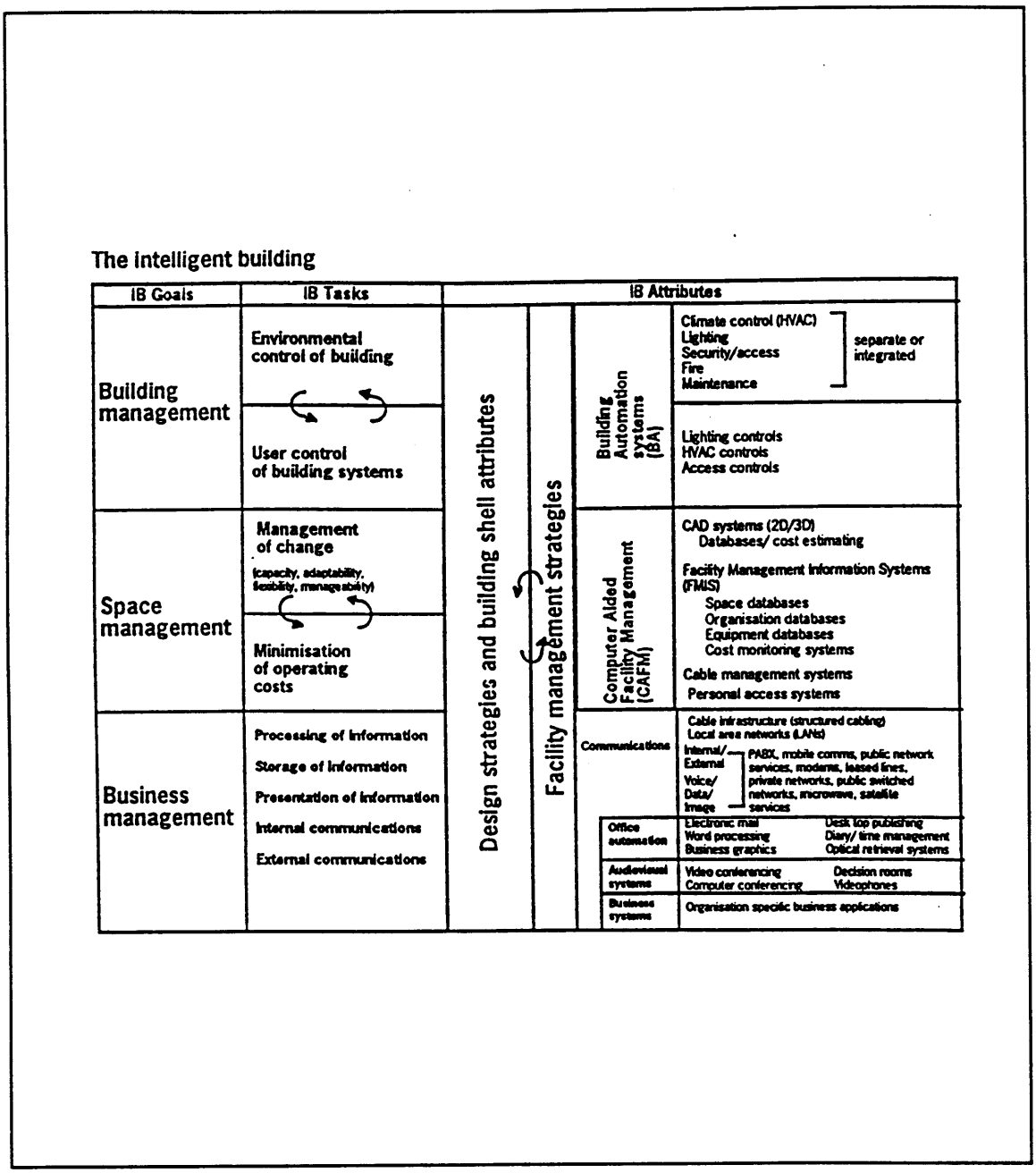
the technological aids described earlier and will need smart people to run the equipment, who work hard, are dedicated and to continually carry on learning to keep 'ahead of the game'.

APPENDIX F

Intelligent Buildings in Europe:

Model of Intelligent Buildings

'The Intelligent Building in Europe' Model of the Intelligent Building[92]



[92]DEGW (London) & Teknibank (Milan) The Intelligent Building in Europe - Executive Summary. A multi-client study in Association with the European Intelligent Building Group. 1992 p7.

APPENDIX G

Intelligent Buildings in Europe:

Model to show Cost Benefit and Savings

'The Intelligent Buildings in Europe' Model of Cost Benefit and Savings[93]

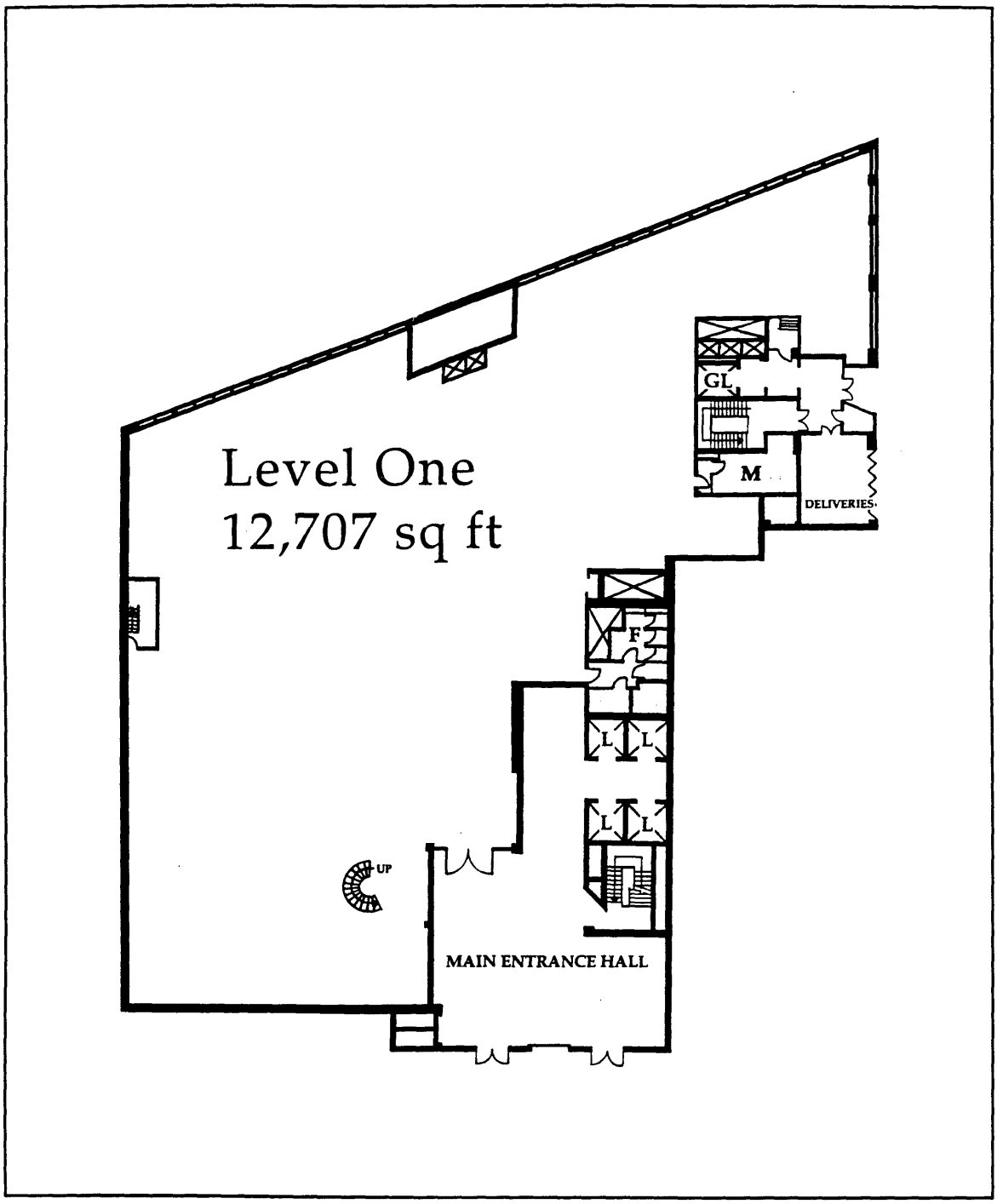
	Efficiency benefits	Effectiveness benefits	Additional costs or benefits
Business management	• Reduced business costs • Reduced support staff • Reduced travel costs	• Increased ease and quality of internal/ external communications • Improved access to information • Support a range of work settings and work patterns	• Impact of IT on building services, cabling, space planning • Increased staff training costs • Increased communication & IT costs • Difficulty of managing a dispersed workforce
Space management	• Minimised move & churn costs • Effective use of space • Better info. about space makes charging and subletting more efficient • CAFM – organisation and space databases ensure better match between supply & demand for space • Better use of equipment and facilities	• Disruption minimised • Accommodate changing organisational needs • Maximise space use over time and support innovative work patterns • Improved staff satisfaction if building is run efficiently • Computer tools increase productivity of FM department	• Level of training/ employment costs of FM department increase • Increased technology costs
Building management	• Reduced energy costs • Reduced maintenance costs • Maximise use of the building • Reprogramme the BA system for different uses • Easy subdivision of building if designed properly	• Increased user satisfaction (use control) • Extended use of building resulted in increased working hours • Organisational productivity improved by matching environment to work tasks	• Can be complicated to run • Staff overheads • Higher system maintenance costs • Higher design/ installation costs • Loss of local control possible

[93]The Intelligent Building in Europe - Executive Summary. A multi-client study by DEGW (London) & Teknibank (Milan) in Association with the European Intelligent Building Group. 1992.

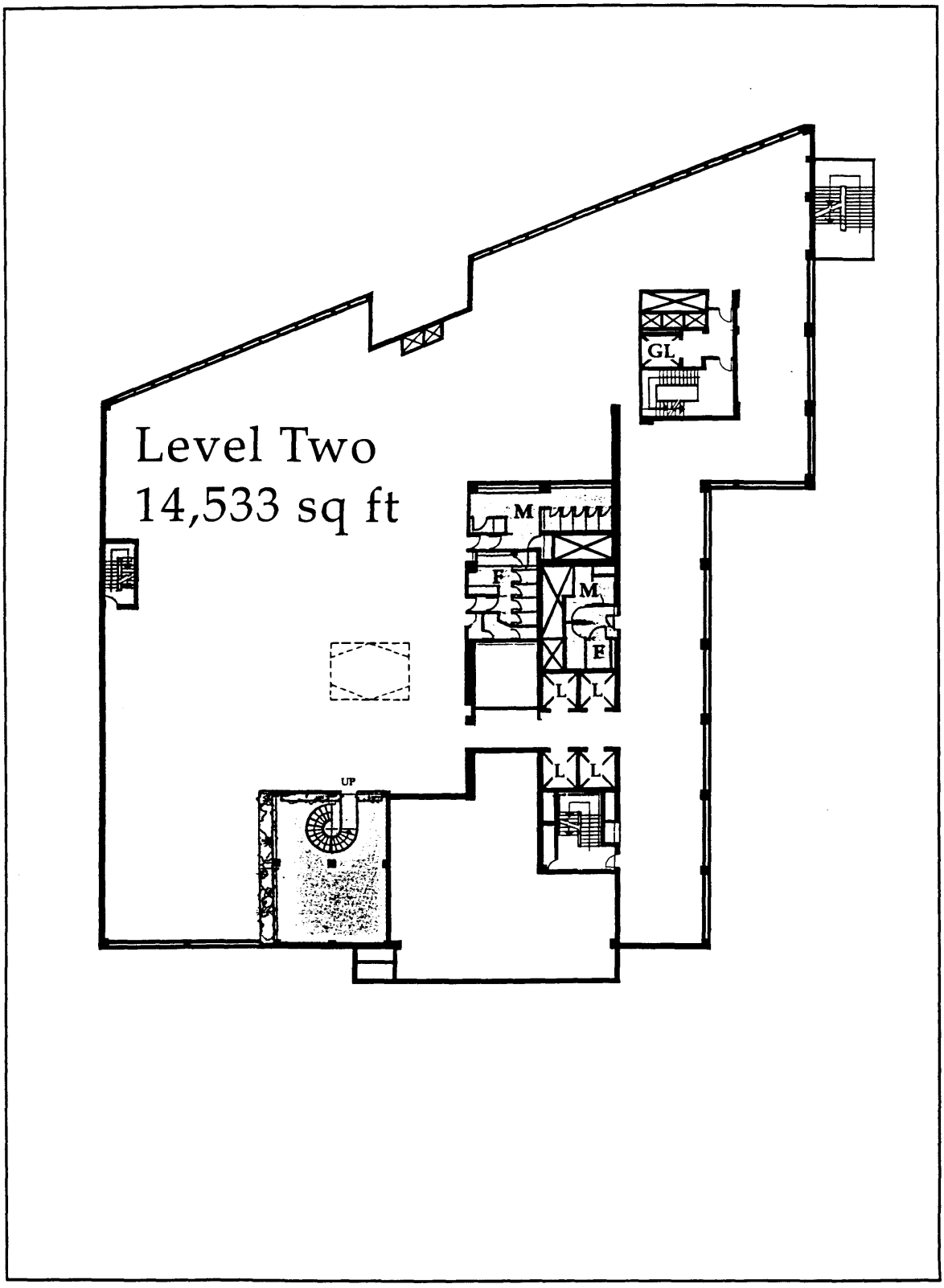
APPENDIX H

City Tower: Floor Plans of 1st and 2nd floors

Floor Plan of the 1st Floor, City Tower



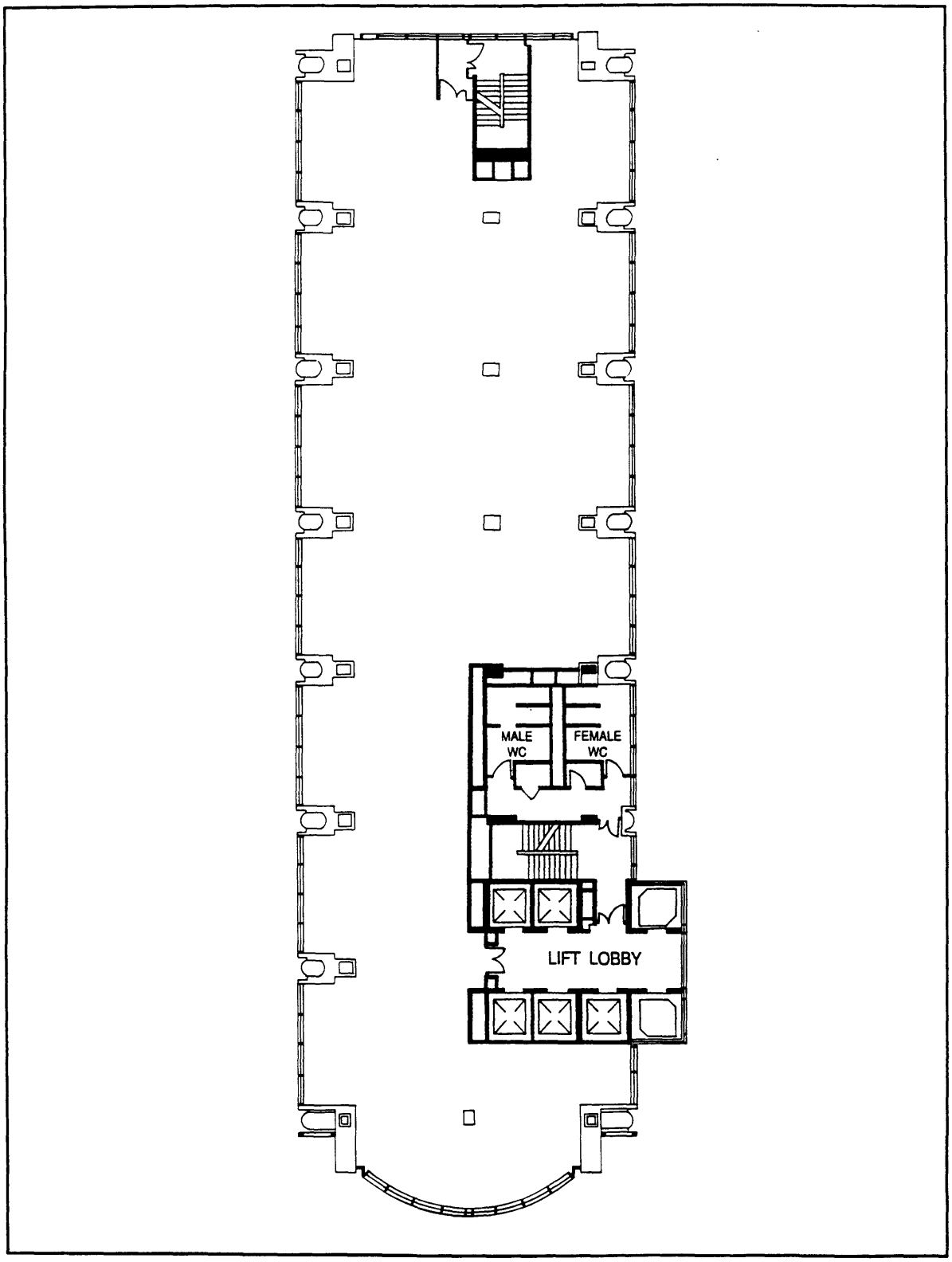
Floor Plan of the 2nd Floor, City Tower



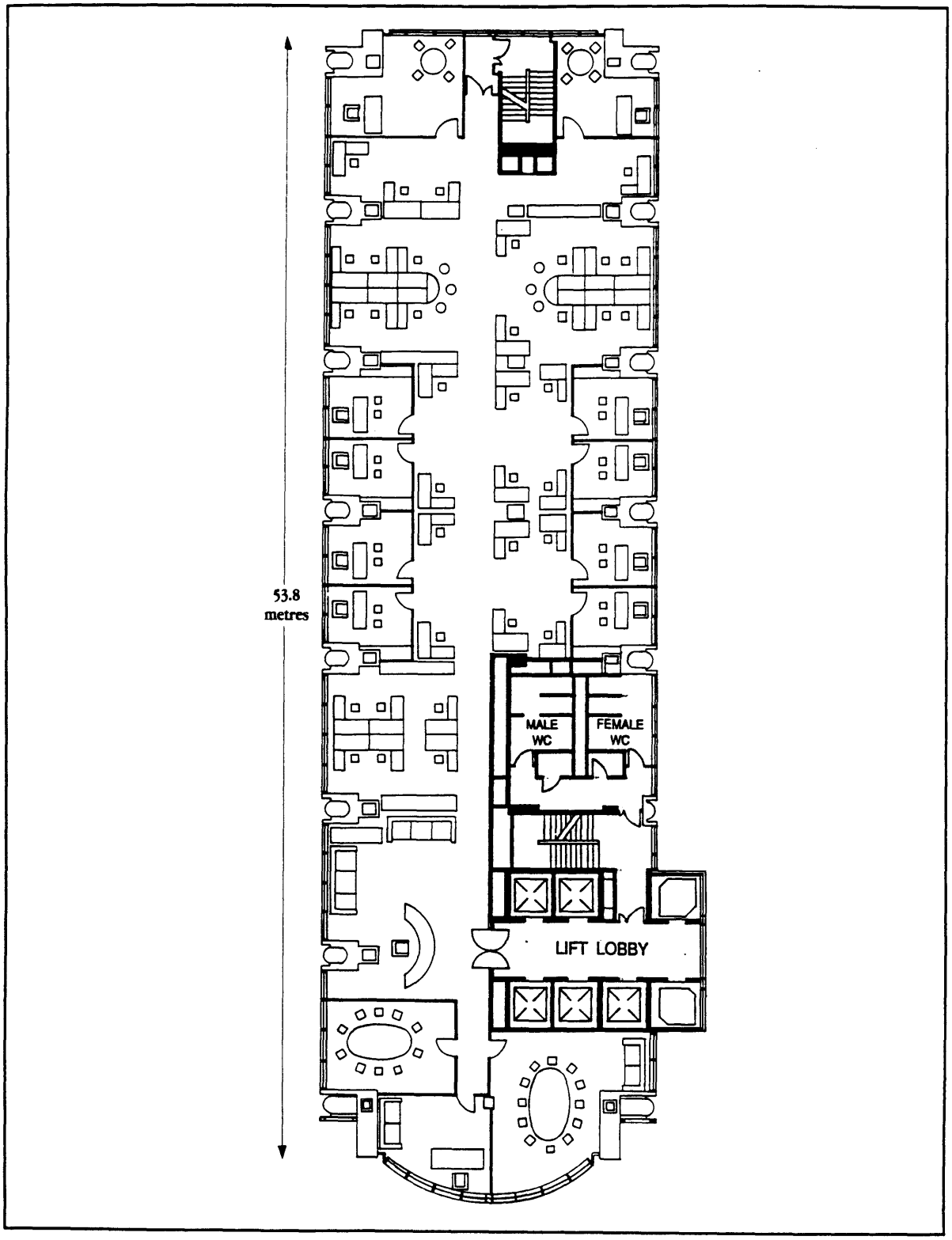
APPENDIX I

338 Euston Road; Typical Floor Plan

Typical Floor Plan at 338 Euston Road



Typical Lay Out Plan at 338 Euston Road



APPENDIX J

Delphi Forecast of Information Technology

Delphi Forecast of Information Technology

Delphi Forecast of Information Technology by William Halal.[94]

Delphi Forecast of Information Technology

Information technologies will grow far more sophisticated in the next few years, but social acceptance of some information services is likely to lag behind technical capabilities, according to a Delphi poll of experts.

Eleven authorities on technology were asked for estimates of the year in which a particular milestone would take place, as well as the likelihood of its occurrence. The accompanying chart lists mean estimates for these forecasts.

The experts were quite confident that significant advances in both computer hardware and software would occur in the next 10 years or so. Examples include optical computers, automated software production, and computer programs that learn by trial and error. However, information services that would replace social interaction—such as teleconferencing, electronic shopping, and telecommuting—were thought to have a more modest likelihood of acceptance even during the first decade of the next century.

Milestone	Year of Occurrence	Probability (0-1.0)
Sophisticated software programs are developed for personalized teaching, managing medical care, total control of all corporate operations, etc.	1996	.95
Expert systems are commonly used to make routine decisions in business, engineering, medical diagnosis, and other fields.	1998	.88
Access to library materials via computer is more convenient and less expensive than going to the library.	2000	.87
Optical computers enter the commercial market.	2000	.86
Small computers about the size of a writing pad are commonly used by most people to manage their personal affairs and work.	2002	.85
Voice-access computers permit faster, more-convenient interaction between humans and machines.	2002	.84
Education is commonly conducted using computerized teaching programs and interactive TV.	2002	.69
Public networks permit anyone access to libraries of data, electronic messages, video teleconferencing, common software programs, etc.	2003	.84
Routine parts of most software are generated automatically.	2003	.82
Parallel processing using multiple chips becomes dominant.	2003	.71
Computer programs have the capacity to learn by trial and error in order to adjust their behavior.	2004	.86
Teleconferencing replaces the majority of business travel.	2006	.40
Half of all goods in the United States are sold through computer services such as Prodigy.	2007	.43
Half of all U.S. workers perform their jobs partially at home using computer systems.	2009	.52

Source: William E. Halal. The author thanks his graduate students, David Collins, Tessa Lucero, Janice Parsek, Joseph Shaffner, and Joseph Timmins, for compiling the Delphi data.

[94]Halal W 'The Information Technology Revolution' *The Futurist* July/August 1992 14