

BROADGATE SPACES

Life in public places

**Report of research into the use of the public spaces in the
Broadgate development.**

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SUMMARY

1 - Aims of the study - The study of the public spaces of the Phases 1-4 of the Broadgate development was carried out between October 1988 and January 1990. Its aim was to establish a factual basis for assessing how far Broadgate had been successful in bringing life to public spaces, how far any success was due to design, and how improvements might be made. The method of the study was direct observation of how people actually use the Broadgate spaces - of voting with the feet, rather than the opinion surveys - in conjunction with computer analysis of the spatial design of Broadgate in its urban context.

2 - Criteria for success

The criteria of success were held to be :

- more or less continuous movement in the public spaces through the working day, with enough during the evenings and weekends to prevent the spaces appearing empty;
- good levels of informal activity such as sitting, eating, drinking, and talking in the main spaces, obviously with the emphasis on the midday period;
- successful attractors, such as events, performances, restaurants and so on which would increase the overall levels of activity in the spaces.

3 - How Broadgate's public spaces work

The study shows that:

- a) - Broadgate is the best used public open space in and around the City of London. Larger numbers stop there to eat, drink, talk or just sit and watch the world go by than in any other open space or spaces. During a sample period in June 1989, a series of one minutes counts showed an average of 483 people had stopped in Broadgate Square, and 164 in Finsbury Avenue Square. Both are higher than any comparable space in the City studied at the same time.
- b) - 81% of the people spending time (i.e stopping, as opposed to simply passing through) in Broadgate's open spaces come from outside Broadgate, 83% in Broadgate Square and 78% in Finsbury Avenue Square. Broadgate's success is thus dependent not on its own occupants, but on outsiders who

choose to come to spend time there.

c) - People who spend time in Broadgate walk on average 439 metres to get there, farther than for any other space studied in the City. People walk a little farther to get to Broadgate Square (454 metres) than they do to get to Finsbury Avenue Square (422 metres).

d) - levels of pedestrian movement in Broadgate are, with the exception of the lower level spaces in Broadgate Circle outside the midday period, in general high and continuous, on a par with, or above those of the surrounding urban area. Thus there is no discernible 'ghetto effect' in Broadgate. If anything, Broadgate has a positive 'multiplier effect' on rates of movement.

e) - rates of pedestrian movement within Broadgate are only marginally affected by temperature. The numbers of people stopping to spend time in the open spaces, however, increases dramatically with increasing temperature.

4 - How design has influenced life in Broadgate's spaces

Computer analysis of the results of the observation study show that:

a) - the levels of movement in Broadgate's public spaces are a function of the way in which the spatial layout has adapted to and taken advantage of the spatial structure of the surrounding area and its pattern of natural movement. Much of the movement within Broadgate is a simple extension, through design, of natural movement in the area;

b) - the high levels of informal activity are influenced by the availability of spaces adjacent to, but not on, main movement lines and with strong strategic visual connections to other spaces;

c) - there are other locations within the development with similar properties where the location of food and drink outlets could generate further foci of informal activity; and that

d) in general, Broadgate builds on natural movement and informal activity to constitute a major attractor in the City for spending time in open space.

5 - Possible improvements

There are a number of relatively minor possible improvements, including:

- a) - minor changes to landscaping in the north-west corner of Finsbury Avenue Square to ease movement into the main body of the Square;
- b) - possible new locations for food and drink outlets; and
- c) - improvements to long range southward visibility from Broadgate Circle.

6 - Lessons of Broadgate - Broadgate shows:

- a) - that urban life is possible in late twentieth century urban spaces, architects can design them and developers can build them;
- b) - that office areas can and should be permeated with public spaces rich in natural movement and informal activity. Our thinking about office developments should be 'de-ghettoised'. But:
- c) designing public spaces for natural movement and informal activity means designing them spatially with great care, with particular attention to making intelligible visual and permeable links among the spaces within a development, and between those spaces and the surrounding urban area.

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Introduction: creating life in public spaces

Broadgate is the most recent of a long series of developments in and around the City of London which have aimed to bring urban life to public spaces. Over the years, the public reaction to these developments has not been encouraging. The current debate over Paternoster Square is a reminder of the low esteem in which the public holds most modern attempts to re-interpret the urban square, just as in the mid eighties the image of the 'windswept piazza' captured public pessimism over the prospects of creating life in Mansion House Square.

But, to the surprise of many, Broadgate's public spaces seem to be working. Throughout the working day, and to a lesser extent in the evening and weekends, there is a sense of constant movement, and in any reasonable weather, people begin to stop and spend time in the spaces, apparently taking pleasure in them. On fine days, especially towards the middle of the day, very large numbers of people are sometimes to be seen in the squares, watching performances, eating, drinking, talking and, it seems, watching the world go by.

In October 1988, Stuart Lipton asked the UCL Unit for Architectural Studies to carry out an independent study of the public spaces of the first four phases of the Broadgate development, to see how far this apparent success was real, how well Broadgate space compared with other public spaces in the City, and how far Broadgate's success, if success it was, was due to design.

The study was to be based on factual observation, rather than opinion surveys, since success in bringing life to public spaces can be judged only by what people do, not what they say. An extensive programme of observations of space use and movement in and around Broadgate was therefore planned to be the heart of the study, focussing on the working day, but also backed up by weekend observations. To provide a sound basis for comparison, other City spaces were to be studied during the key midday period. This observation phase of the study was intended to give a definitive answer to the question: How are the Broadgate spaces working so far, and how do they compare to other spaces in the City.

To answer the question: How far has the performance of the Broadgate spaces been influenced by design, the observation study was to be backed by the use of 'space syntax' computer techniques to analyse the layout of Broadgate in its urban context. Because 'space syntax' expresses the pattern properties of urban and building layouts as numerical parameters,

it permits a rigorous exploration of the relation between these spatial parameters and space use and movement counts. Through statistical analysis, the influence of layout design on patterns of use and movement can then be identified and quantified.

The state of the art

Past research using 'space syntax' techniques for studies of pedestrian movement and space use in urban areas has shown that layout design has a bearing on all the main aspects of space use which are vital to the creation of life in public spaces. For example, the sense of living space depends on pedestrian movement being more or less continuous, rather than episodic. It is no use if large numbers of people rush through spaces during the rush hour, but leave them empty during the working day. Where movement is more or less continuous in urban space, then research shows that it arises from the patterns formed by lines of sight and access in the urban grid itself.

We must of course distinguish continuity of movement from the sheer quantity of movement. Where there is both continuous movement and a great deal of it, then it is because the lines of sight and access through those spaces are strong. Where movement is continuous but relatively sparse, it is because the lines of sight and access are relatively weak. A good urban environment has both strong and weak lines, but maintains continuity in all spaces.

But what counts as a strong or weak line doesn't simply depend on what a space looks like visually. It depends on how it related to all other lines in the layout, more precisely on the degree that it possess a mathematical property called 'integration' in relation to the whole pattern of lines (the 'axial map') formed by the urban grid. Integration expresses mathematically how complex routes are from each line to every other line in the urban grid, and uses this to predict (or post-dict) the degree to which each line in a layout will be used for natural movement.

It follows that if new developments aim to use natural movement to help create life in their public spaces, then it can only arise from how the layout of the development fits into the lines of sight and access in the existing grid of the surrounding area, and how this distributes and redistributes the property of 'integration' within and around the development. This is clearly a major issue in Broadgate.

Research has also shown that the degree to which open spaces are used or

not used for informal or 'unprogrammed' activities also depends on spatial design. We may define the unprogrammed use of space as uses which do not depend on the provision of specific attractions or facilities, such as performances, or specific owned facilities such as outside seats and tables for wine bars, but which arises from the exploitation of publicly available opportunity - for example sitting to eat or drink on public seats or low walls, stopping to talk, or even simply watching passers-by.

It is a noticeable feature of the City of London that some open spaces seem to work well for unprogrammed use, while other seem to failed dismally. An earlier study carried out in 1984 for the Mansion House Square Public Inquiry showed that the degree to which spaces generated unprogrammed use was a function of the degree to which they provided locations which were not actually at the intersection of main lines of sight and movement, but which were strategically located in relation to these lines, so that relatively protected locations were close to lines of movement. Formally, good locations for unprogrammed use were found to be those which were convexly related to the intersections of integrating lines.

The third component of success in creating life in urban spaces is the provision of 'programmed use' in the form of specific attractors and facilities. From a design point of view, we must distinguish strong from weak attractors. A small shop providing everyday goods is not really an attractor, but needs to capture the passing trade if it is to do well. A more specialised or upmarket shop, however, may 'attract' a far higher proportion of its clientele, and this clientele is likely to be smaller and to pay more for each transaction. Such shops may benefit from being close to main lines of movement, but do not depend on them to the same extent. The stronger the attraction, the more the shop can afford to - and may even benefit from - a slightly greater degree of seclusion. The location of such shops is probably optimal when it is one step away from a main line of movement, but nevertheless visible from it, thus gaining the benefits of seclusion without losing the advantages of integration. These considerations are crucial at Broadgate.

Larger scale attractors such as performances or shopping centres obviously have a greater power to draw people from greater distances, and do not therefore depend directly on integration. Even so, if they are to form part of the life of public spaces, then they are probably optimally located no more than one step from main lines of movement, so that visible contact is maintain between the attractor and natural movement. Again, this is a key issue at Broadgate.

How the study was carried out

X² - The study was designed to allow these three criteria of success in creating life - natural movement, unprogrammed activity and attractors - to be dealt with in such a way as to clarify their relation to design. The initial letter describing then proposed study is set out in **Appendix A**. After the study was commissioned in October 88, the study design was considerably extended in order to make the factual basis as full as possible and to take account of different stages of completion and different conditions and weathers. For example, for some of the study period the northern entrance to Broadgate Square was partially or fully blocked, at others the ice rink was substituted for open space, and so on.

Since the commissioning of the study, the timetabling and progressing of the study has been as follows.

Before the weather broke in the latter half of the fine **October** of 1989, a preliminary programme of 30 observations of space use and movement in 63 selected spaces in Broadgate and its surrounding area (19 in Broadgate, 44 in the surrounding area) was carried out using standard 'moving observer' techniques. Observations covered 5 time periods during weekdays (8-10 am, 10-12 noon, 12-2 pm, 2-4 pm and 4-6 pm), and the midday period on Saturdays and Sundays. The results are set out in raw form in **TABLES B and C** and in visual form in **Figures 9 and 11**. These figures show the observation route taken by moving observers, and the number of dots on each line segment represents the average number of people moving on that line during a one minute period throughout the period of study. During the observational period, there were construction works in progress immediately to the north of the north entry to Broadgate Square, and access was reduced to a narrow path. Also at this stage the eastern and north-western buildings were still being fitted out, and were not yet occupied. Both facts had marked effects on space use and movement.

Also during **October 89**, for comparative purposes, a preliminary observational study of 6 other City open spaces during the midday period was carried out. These spaces are shown in black in **Figure 22**. All but had been studied before in preparing evidence for the Mansion House Square Public Inquiry.

✦ In **November 88** a computer model of the layout of Broadgate and its surrounding area (within the dotted line on **Figure 5**) was made and analysed. The model was analysed with the Broadgate site as it was before development, with Broadgate as it was at the time of the study, and with

Broadgate as it will be when the development is complete. The main features of this analysis are reviewed in the main text of the report below.

In **December 1988** the results of the preliminary observation programme were analysed statistically in relation to the computer analysis of the area layout. The results showed strong correlations between observed movement patterns and the pattern of integration revealed by the computer analysis, both within and around Broadgate, thus validating the computer model as a basis for investigating space use and movement in Broadgate in more detail. The results of this phase of the study are tabulated in the main text below.

In **January 1989** a full programme of fieldwork and analysis was drawn up in the light of the preliminary study. It was decided to conduct more detailed studies of space use and movement during two five week periods in early and late spring, the first during February and March, while the ice rink would be in operation, and the second during April and May when the ice rink would be replaced by an open space. A full simultaneous study of Broadgate and the 6 other city spaces would then be carried out in June. This would include an 'origin-destination' study in which 50 people in each space would be asked where they had come from and where they were going to, with a view to finding out the catchment area of each space.

In **February-March 1989** the first five week programme (with ice rink) of detailed observations was carried out. These observations did not use the 'moving observer' technique (which is really geared to the study of movement patterns), but marked the position of each moving or stationary individual in the spaces during a specified time period on a map of the layout. The key results are summarised in visual form in **Figures 17a and 17c**.

In **April and May 1989** the second five week programme of detailed observations was carried out, following the dismantling of the ice rink. The key results are set out in visual form in **Figures 17b and 17d**. During the whole of this 10 week observation period, the north entry to Broadgate Square was completely blocked, though by then the north east building was occupied, and the north west building was in the process of being occupied. The southern parts of the east building were however still being fitted out. Fitting out and occupation of shops in the lower level of Broadgate square was also incomplete at this stage. The raw data for all ten weeks is set out in **TABLES D, E, F and G**

In **June 1989** a simultaneous study of the 6 City open spaces and the two

Broadgate Squares was carried out to establish rigorous grounds for comparison. The raw results are set out in **TABLE H** and discussed in the text below. During this phase the north entry to Broadgate Square was open (though minor works were still continuing). Fitting out and occupation of buildings and the lower level shops was also still incomplete at this stage.

Between **June and December 1989** a draft report was written and a summary of the main results sent to Stuart Lipton. However, the final completion of the report sending of the report was held up pending further data analysis on the ways in which design was influencing space use and movement. To clarify outstanding matters, it was decided that a further brief observation study was needed when all entries to the development were open, all buildings occupied and all shops let, since no previous period had allowed Broadgate to be seen in full working order.

This final observational study was carried out in **January 1990** and is discussed in the main text below. There is no doubt that this final observation period was crucial to clarifying the relation between the design and how it is working. The important lessons learnt in this final study remind us that the development is still incomplete, and that the results of the present study can only be seen as interim. Even in Phases 1-4, we still have not had the opportunity to see the development fully occupied and fully open, and with the open space in Broadgate Square rather than the ice rink. The situation may develop further once the whole development is complete.

Introducing Broadgate

Broadgate is a comprehensive office development, incorporating a number of large squares, spaces and amenities intended for public use, carried out by Rosehaugh Stanhope Developments PLC, in partnership with the British Rail Property Board. The development is located to the north east of the City of London, on a site formally occupied by Broad Street station, and partly forming an air rights structure over the platforms and approaches to Liverpool Street station.

Figure 1 is a general plan of Broadgate showing the phases of development. Arup Associates designed Phases 1 to 4, and construction of the first phase began in February 1985. At the time of writing these phases were fully complete and occupied. Skidmore, Owings and Merrill designed stages 5 through to 14. At the time of writing, phases 5, 6, 9, 10 and part of 7 are complete and occupied, 8, 11 and 14 are still under construction, and 12 and 13 have not yet been started.

There are two adjacent and related developments. Numbers 1, 2 and 3 Finsbury Avenue were also designed by Arup Associates, for Rosehaugh Greycoat and built immediately prior to the main Broadgate development. The refurbishment and remodelling of Liverpool Street Station, including the construction of a new concourse which links directly with phase 3, is being carried out by British Rail, under the supervision of its own architects department. The design of both of these developments is strongly related to the main Broadgate development and can effectively be considered an integral part of the overall masterplan.

This study is concerned with the main squares and spaces which have already been completed and opened for public use. These are located within the Arup designed sections of the development, and consist of Broadgate Square, whose boundary is defined by phases 1 to 4, and Finsbury Avenue Square which is defined by phases 1 and 2, together with numbers 1 and 3 Finsbury Avenue. These are shown in **Figure 2** with detailed plans given in **Figures 3 and 4**. During the time of study minor construction work was still proceeding near phase 5, which intermittently restricted access to the these squares from the north.

A third large space, Exchange Square is to be created as part of the Skidmore, Owings and Merrill air rights development over the approaches to Liverpool Street Station. At the time of study, this square was not yet open to the public and has not therefore been included in the study. For the purposes of this study the site boundary of 'Broadgate' will be defined as extending from Sun Street in the north, to Eldon Street in the south, and Wilson Street in the west to Liverpool Street station in the east.

The ground level spaces of Phases 1 - 4 have been given over exclusively to pedestrian use, with servicing and parking below ground. Of the two squares, Broadgate Square, located in the south east corner of the site, has a more complex multi-level character. The surrounding office buildings define an overall envelope which is square in form, but located within this square is a circular stone clad colonnade and screen, beneath which there are a number of kiosks and sheltered seating. Four sets of stairs lead to to a first floor wine bar. The colonnade surrounds a circular arena, located a half floor level below the main part of the square. The arena is accessed by two broad sets of stairs, which also form an amphitheatre. During the summer the arena is used for performances, mainly at lunchtime, including music, theatre and promotions. In winter the arena is turned into an outdoor ice rink.

The space below the arena/ice rink is used as a multi purpose hall. It is surrounded by circular passageway, which is one floor beneath the main level of the square, and is partly covered over. Retail outlets, including two winebars, a bookshop, snack food counter, skate hire, and restaurants are located around the perimeter of the passageway.

There are three entry points into Broadgate Square. The main opening is located at its southern end. A small space, with a centrally located monument, links the square with three main routes: Eldon Street coming from the west, the new station concourse from the east and Blomfield Street, whose northern continuation is directly aligned with the centre of Broadgate square. This alignment is reciprocated on the opposite side of the square, where a wide passage between Phases 1 and 4 leads directly to Appold Street and Sun Street. This makes it possible, during the summer, to walk in a straight line from Blomfield Street, across the arena, directly to Appold Street. A third opening links the north west corner of Broadgate Square with the south east corner of Finsbury Avenue Square. Located within the opening is a circular pavilion occupied by the development management offices.

Finsbury Avenue Square is smaller (though it appears larger), simpler, and more or less on one level. The surrounding office buildings again define a square envelope, and the only non-office use on the square is a pub in the north-west corner. The central portion of the space is differentiated from the perimeter by being set slightly lower, and faced with cobblestones as opposed to the paving stones used elsewhere. This area contains a number of granite faced blocks used for seating. The space within the square is further articulated by landscaping in the south east corner, and a fountain in the north west corner.

In addition to the connection with Broadgate Square, there are three main entry points into Finsbury Avenue Square. In the north east corner, an opening links the square with Appold Street. The corners of the two adjoining buildings have been chamfered to allow the line of Appold Street to continue directly into the centre of the square, and the line of Clifton Street also lines up with this opening. The other entrances are Whitecross Place, which links the north east corner of the square, through shops and a further small space, to Wilson Street, and Finsbury Avenue which links the south west corner to Eldon Street. The line of Finsbury Avenue is continued through a narrow passageway, and across a service yard to Sun Street in the north.

Location in the urban pattern

The site, as it was prior to development, and its location within its urban context are shown in **Figure 5**. The dotted line drawn through Great Eastern Street, Commercial Street, Aldgate High Street, Leadenhall Street, Cheapside, Aldersgate Street and Old Street shows the boundary of the contextual area for Broadgate as we have defined it for the purposes of this study, including the making of a computer model of Broadgate in its urban surroundings.

Figure 6 shows the 'study area' of **Figure 5** in another way. All the ground level space of public access in the area is shown in black, and the built areas are left white. This is a useful aid to visualising public space, since it makes matters of pattern, footprint and scale easy to see. **Figure 7** then repeats **Figure 6**, but replaces the Broadgate site as it was with the Broadgate development as it will be when completed.

The Broadgate site is located 300 metres north of the Roman Wall which marked the historic boundary of the 'square mile' of the City. In terms of the development of the City as a whole, the site might be said to be located in a transition zone between the extensively developed, financially oriented office based activities of the City to the south, and the less developed mixture of offices, light industry and residential accommodation to the north. The site cannot be said to have the advantage of a strategic location in terms of the City as a whole, but this is partly compensated by its location immediately adjacent to Liverpool Street Station, which is an important entry to the City for both British Rail and London Underground services.

The site is also sandwiched between two major arteries - Moorgate and Bishopsgate, which link the City with surrounding parts of London, although neither is directly adjacent to the site boundary of the phases at present under study. Of the adjacent streets, Wilson Street and Sun Street both have a quiet, local character, faced largely with small scale, unmodernised Victorian buildings. Eldon Street is busier, and being aligned on an east west axis, links the site with Moorgate. Blomfield Street extends southwards from the site towards the heart of the City, but terminates after only a few hundred metres at London Wall.

The existing structure of the area, and the effect of Broadgate on it, can be clarified by computer analysis using 'space syntax'. On the basis of an 'axial map' (the least set of lines of sight and access that cover the whole system of public space) of the area layout as shown in **Figure 6** was made

(shown in **Figure 8a**) and analysed in three versions of the area : as it was before Broadgate; as it was during the study period; and as it will be when the development is complete. The last two were also analysed in their winter and summer forms i.e. with and without the ice rink in operation. Data on the site and its surrounding area are set out in **TABLE A** in which all relevant numerical statistics are tabulated, and **Figure 8b-k** which show graphically the distribution of 10% most integrated lines (black lines numbered in order of integration) and 50% most segregated (dotted lines) for each version of the analysis (**Figure 8b,d,f,h & j**) and similar maps for 25% most integrated and segregated (**Figure 8c,e,g,i & k**).

† From the point of view of the present study, a number of key guidelines can be drawn from the analysis. Before development, the Broadgate Phases 1-4 site occupied a rather unstrategic location in the urban structure. It is surrounded on the west, south and north by the local 'supergrid' of Moorgate, London Wall and Bishopsgate but is well away from all of them. The area to the north of the site is relatively weak in integration because the upper parts of both Bishopsgate and Moorgate act to some extent as 'configurational barriers' in the urban structure. In the case of Moorgate, this is due to the large area to the west occupied by the barracks; and in the case of Bishopsgate, it is due to the fact that the area east of Bishopsgate (Spitalfields and the Petticoat Lane area) is rather poorly connected to Bishopsgate, and even more poorly connected through Bishopsgate towards the west, and therefore acts as a relatively independent area, with its main lines running NW-SE and SW-NE, roughly at 45 degrees to the grid around Broadgate. The results from computer analysis seem strongly to confirm intuition and everyday functioning of these areas. They are a common result of radial growth from an urban centre;

The strongest line adjacent to the site in the pre-Broadgate area is Eldon Street, which is the twelfth most integrating line in the area (Moorgate being first. London Wall second and third, and Bishopsgate fourth). The line is strong because it links the areas west and east of Moorgate, but weaker than it would be if it were not end-stopped at right angles to the west by the Barbican and to the east by Liverpool Street station. The next strongest line adjacent to Broadgate is Blomfield Street, which is 19th in the area, and points straight into the site, unlike Eldon Street, which is adjacent rather than incident.

These results suggest that the Broadgate site does not have the natural advantage of a strongly integrated location, but must optimise the potential the area does offer to create a layout which in general improves

integration, avoids setting up new barriers in the area, and tries to create a 'chunk' of integration rather than a single strong focus.

Looking at the analysis of the complete development as it will be in its urban context in **Figure 8j**, we can see that the pattern of integration in the area will have shifted in certain important respects. Eldon Street will have gone from being the 12th most integrating line in the area to being the 5th, mainly through the direct link that now exists through the concourse of Liverpool Street station; Blomfield Street will have gone from being 19th to being 13th; Bishopsgate will improve from 4th to third; and, more generally, the area to the north of Phases 1-4, including the curved line of Appold Street, will have become substantially more integrated. These results show that the Broadgate development as a whole will improve integration in the area in general, and in the area around Broadgate in particular.

If we now turn to the area as it was during the study period, with the development partially complete, we can see that Broadgate is already having beneficial effects on the area. Broadgate already in fact improves the overall integration of the area (from .730 to .713. in numerical terms: lower values means low integration). The layout of Broadgate itself in urban context is also more integrated than the mean for the surrounding area (.649 to .713). All lines penetrating the development from then outside are integrated, and draw integration into the site. They do not however cross it, and exclude the line linking the two squares. On the other hand, when the Phases 1 - 4 of the development are analysed on their own, independent of the surrounding area, the line linking the two square is the most integrated line. This suggests that Broadgate Phases 1 - 4 follow an interesting formula for a strategic stopping place. Lines reach to it but do not cross it. Something like it is often found in English market squares. The parallel is not exact, but suggest an interesting formula with precedents.

Broadgate thus integrates, but in an interesting way. It adapts the strong global structure available locally, and creates a locally focussed structure, which nevertheless has an integrating effect on the area as a whole. It does so not by creating a single new focus, but by a series of gradualist adaptations of the existing structure which eventually add up to an identifiable new element in the area layout.

We can now look at the effect this has on space use and movement, but first we must establish the existing picture in the surrounding area.

Pedestrian movement in the area

Pedestrian movement in the area around Broadgate closely follows the distribution of integration as it has just been described. **Figure 9** summarises the results of the October 88 area movement study. The heavy black lines show the observation route, and the number of dots the number of moving adults per hundred metres for each line averaged for 30 observation rounds spread throughout the working day. **TABLES B and C** sets out the full data in raw form.

The most obvious feature of the distribution is that movement rates are much higher towards the south and east than they are to the north and west. The influence of Liverpool Street station as the strongest attractor in the area is clear, but it is nowhere near as dominant as might be expected. Whereas in the centre of the City certain spaces carry much more movement during the rush hour than at lunch time (Walbrook and Bucklersbury, for example) this is not true of any of the major spaces in the Broadgate area. All peak in the midday period rather than in the rush-hours.

A broad division of the area into sectors shows that movement rates are highest in the south east area, that is in the sector that falls within the walls. These much higher rates are almost certainly a product of the much higher average height of buildings in this area. The lowest rates of movement are in the northwest area, which may be exaggerated by the substantial amount of rebuilding then under way in that area.

Significantly, if the observed lines are divided into those that are aligned north-south (more or less) and those that are aligned east-west (and discounting diagonals) then the north south line have on average much higher movement rates at 18.27 phm/m (people per hundred metres/minute) than east-west lines at 13.36 phm/m.

The degree to which the pattern of movement has been created by the distribution of integration in the urban grid is best shown by a scattergram (see for example **Figure 10** below) in which each circle represents one of the observed line segments, with its position on the horizontal axis indicating its integration value and its position on the vertical axis its average movement rate per hundred metres/minute. The line passing through the circles is the 'regression line' indicating the optimal path of those circles. To the degree that the circle form a tight line from bottom left to top right (or top left to bottom right if the relation is negative) then movement can be predicted from integration. The 'correlation coefficient' is a value between 0 (no relation) and 1 (a perfect

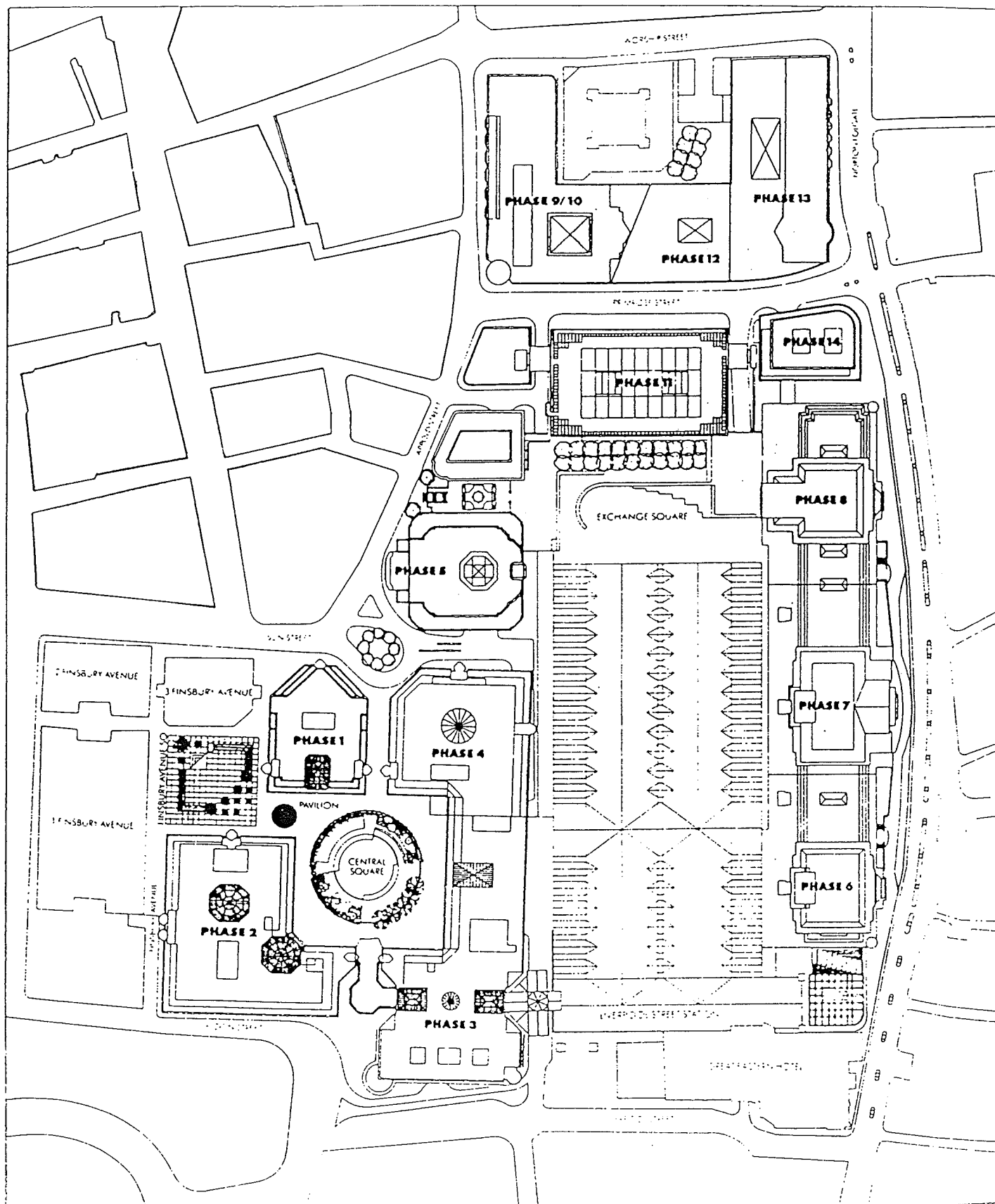


Figure 1

General plan of the Broadgate development, including Liverpool Street station, as it will appear when complete.

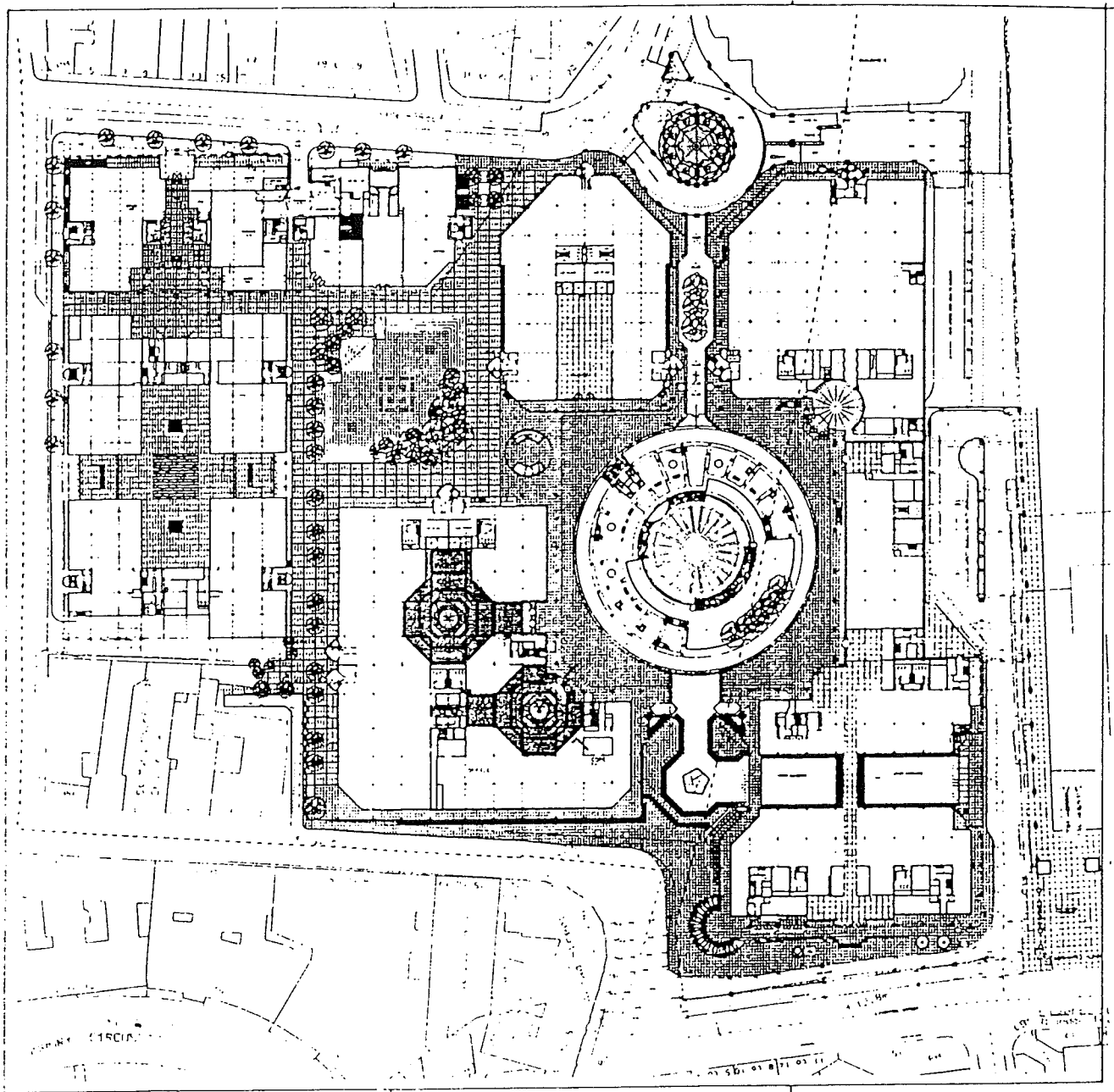


Figure 3
Ground level plan of Broadgate phases 1 - 5 and numbers 1-3 Finsbury Avenue.

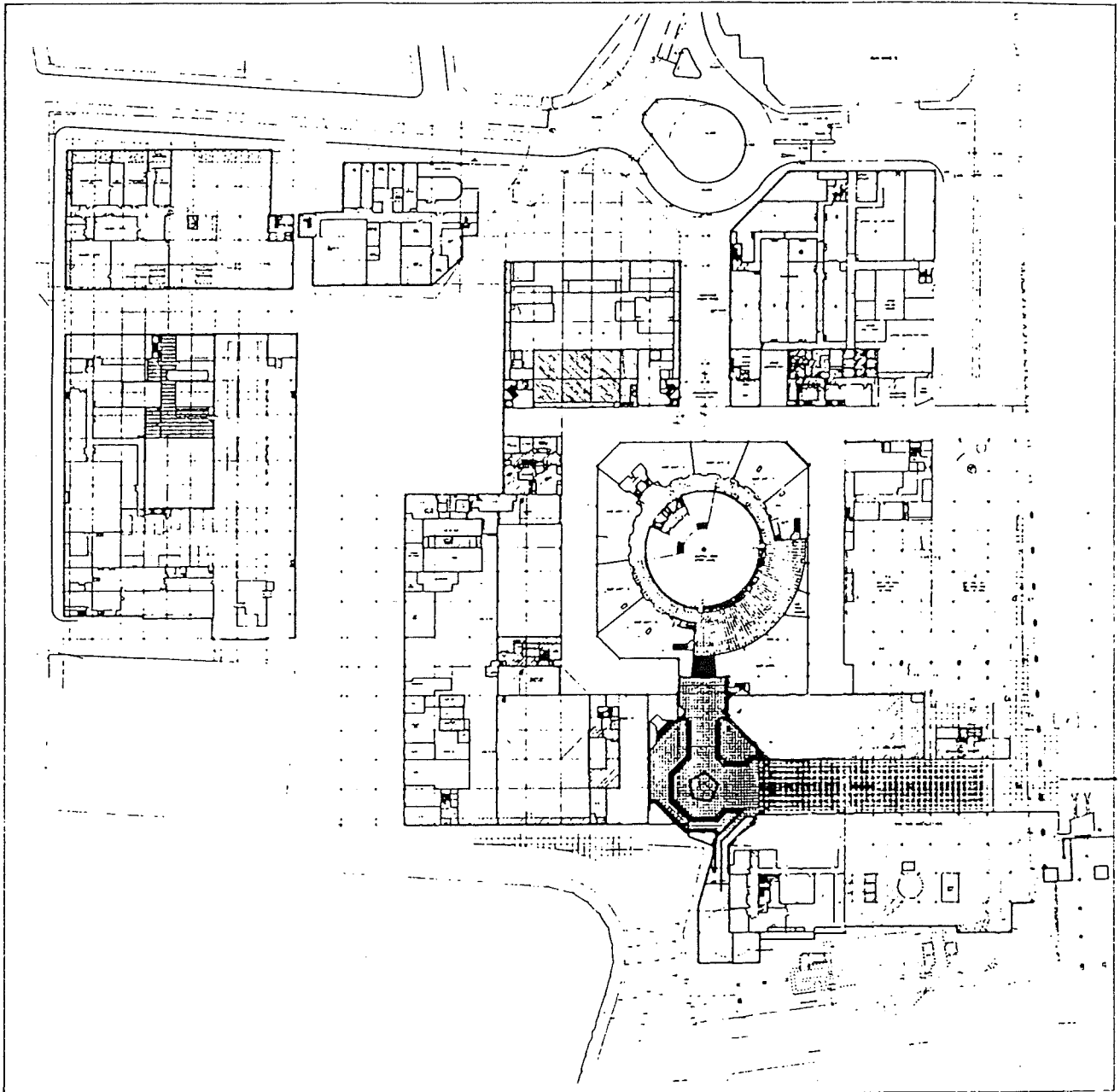


Figure 4

Basement level plan of Broadgate phases 1 - 5 and numbers 1-3 Finsbury Avenue. The plan shows the new concourse to Liverpool Street station in the SE corner, and the retail element located below the arena in Broadgate Square.

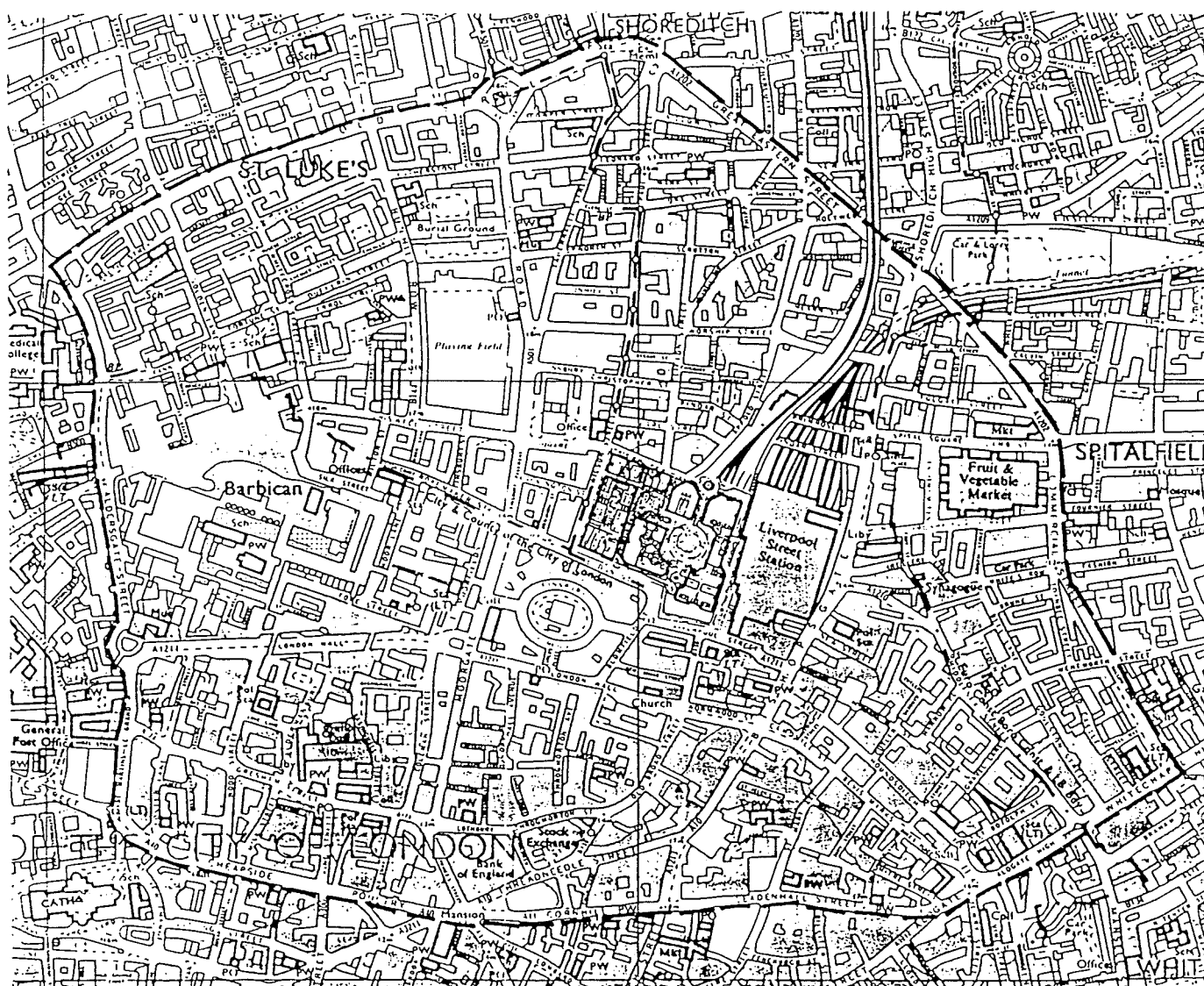


Figure 5

General location of the Broadgate development. The dotted line indicates the boundary of the contextual area as defined for the purposes of this study.



Figure 6

Broadgate contextual area, prior to redevelopment. All of the ground level space open to public access is shown in black, building blocks and inaccessible space is shown in white.



Figure 7

The Broadgate development in its contextual area as it will appear when fully complete. All of the ground level space open to public access is shown in black, building blocks and inaccessible space is shown in white.

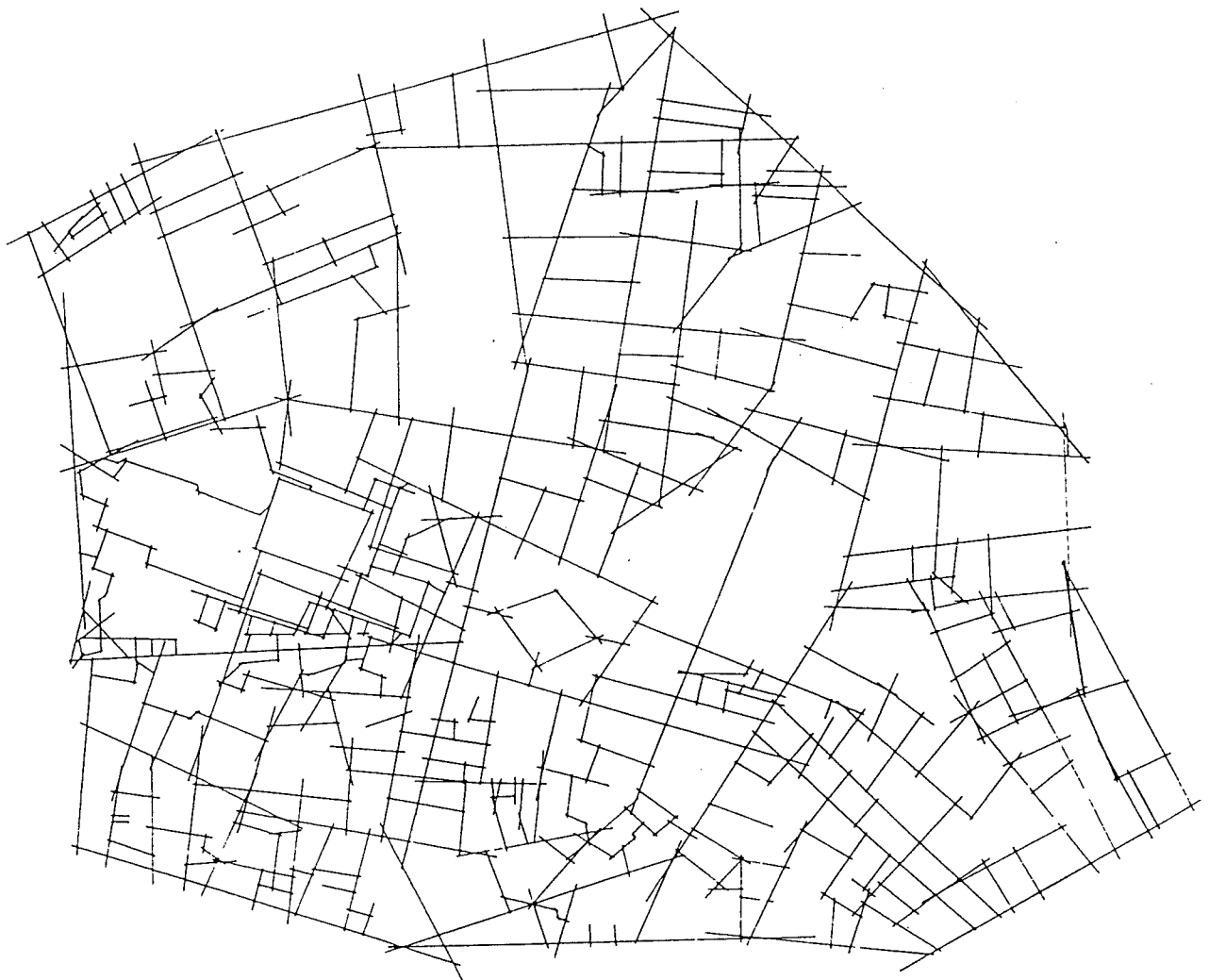


Figure 8a

Axial map of the contextual area prior to redevelopment. The map shows the fewest and longest lines necessary to cover all of the open space structure shown in figure 6.

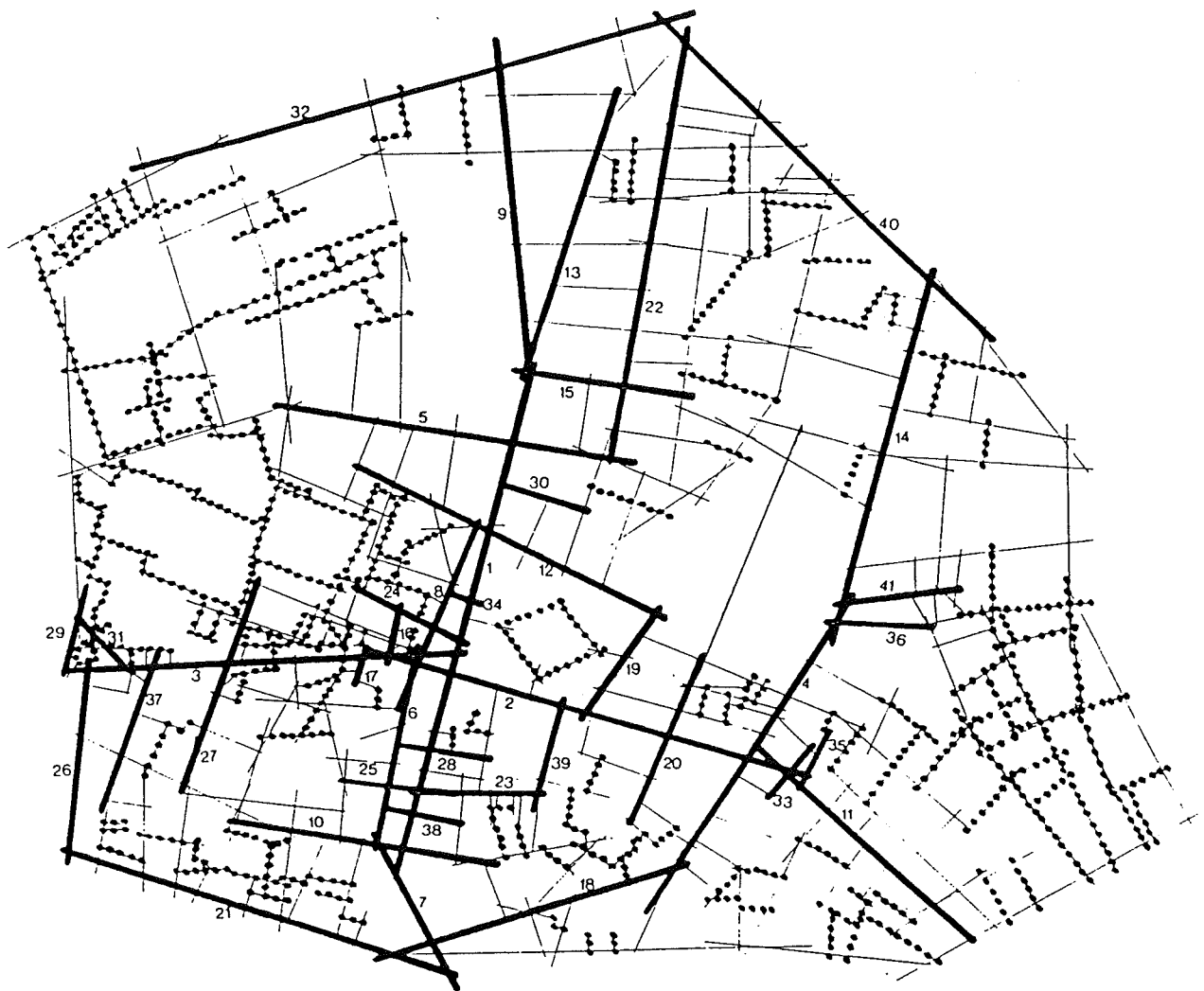


Figure 8b

Axial map of the contextual area prior to redevelopment. The 10% most integrated lines are shown in bold, and are numbered in the order of integration. The 50% most segregated lines are shown dotted.

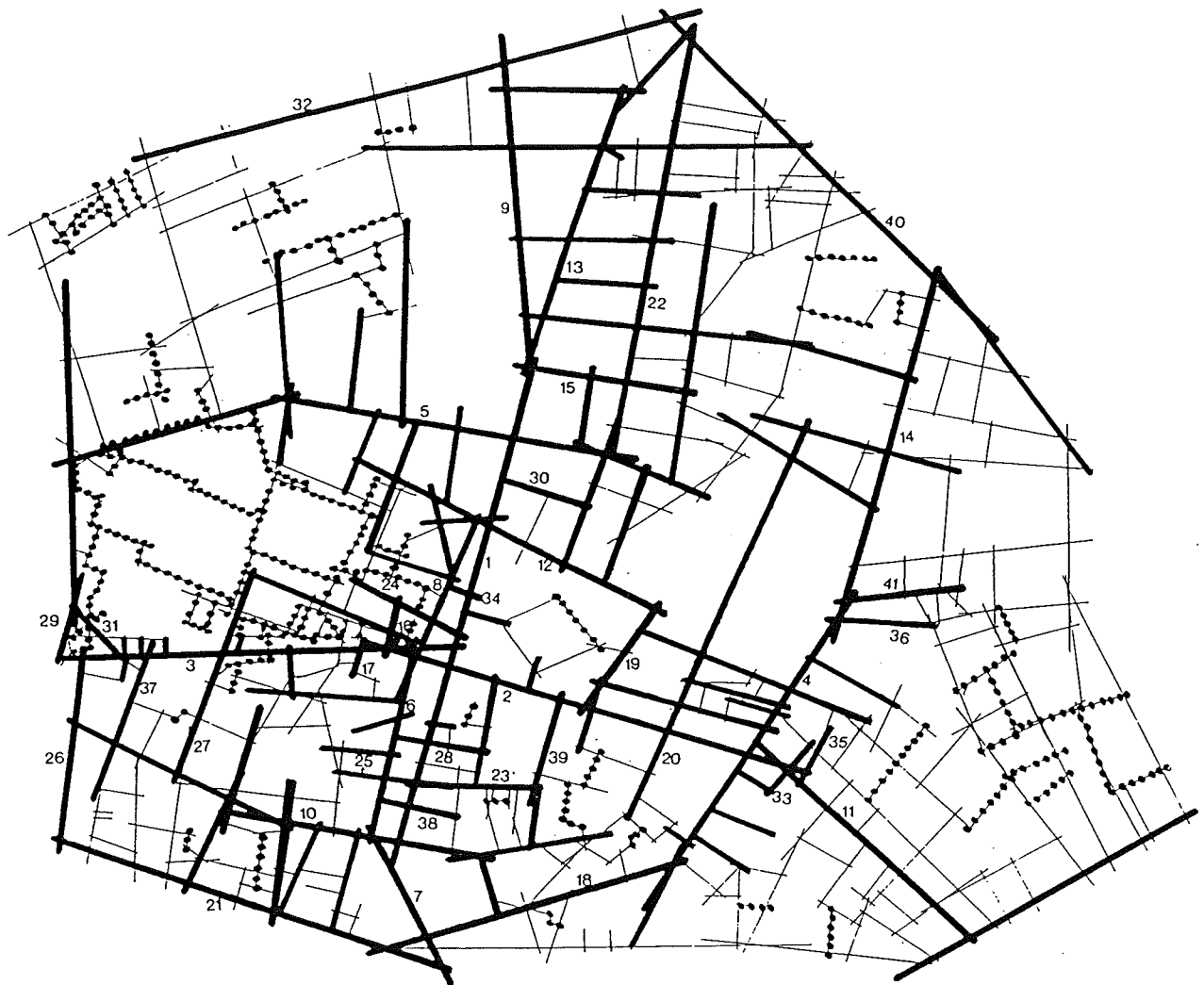


Figure 8c

Axial map of the contextual area prior to redevelopment. The 25% most integrated lines are shown in bold, with the first 10% numbered in the order of integration. The 25% most segregated lines are shown dotted.



Figure 8d

Axial map of the Broadgate development, in its contextual area, as it appeared at the time of study - with the ice rink in operation. The 10% most integrated lines are shown in bold, and are numbered in the order of integration. The 50% most segregated lines are shown dotted.



Figure 8e

Axial map of the Broadgate development, in its contextual area, as it appeared at the time of study - with the ice rink in operation. The 25% most integrated lines are shown in bold, with the first 10% numbered in the order of integration. The 25% most segregated lines are shown dotted.



Figure 8f

Axial map of the Broadgate development, in its contextual area, as it appeared at the time of study - without the ice rink and free access across Broadgate Square. The 10% most integrated lines are shown in bold, and are numbered in the order of integration. The 50% most segregated lines are shown dotted.

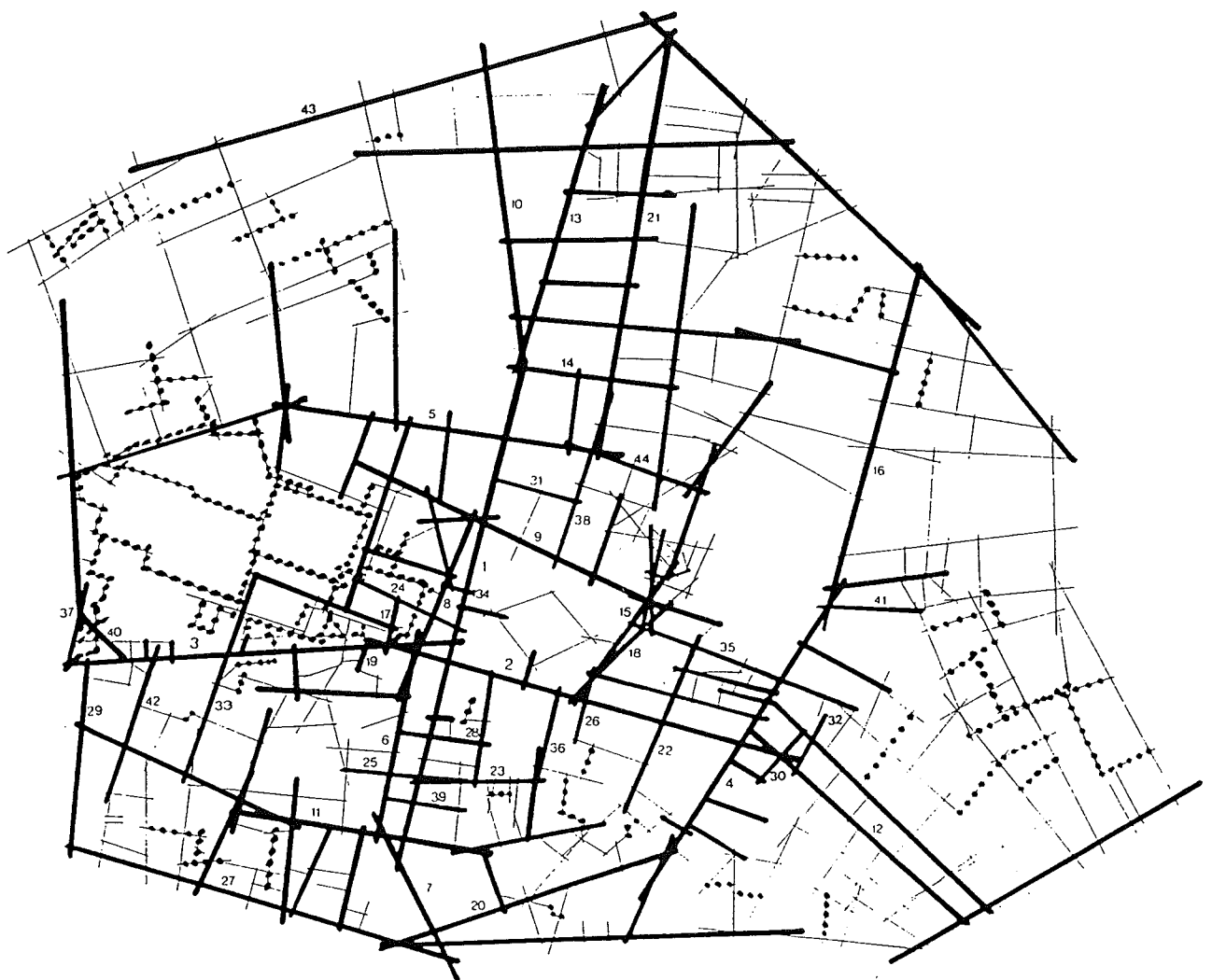


Figure 8g

Axial map of the Broadgate development, in its contextual area, as it appeared at the time of study - without the ice rink and free access across Broadgate Square. The 25% most integrated lines are shown in bold, with the first 10% numbered in the order of integration. The 25% most segregated lines are shown dotted.



Figure 8h

Axial map of the Broadgate development, in its contextual area, as it will appear when fully complete - with the ice rink in operation. The 10% most integrated lines are shown in bold, and are numbered in the order of integration. The 50% most segregated lines are shown dotted.

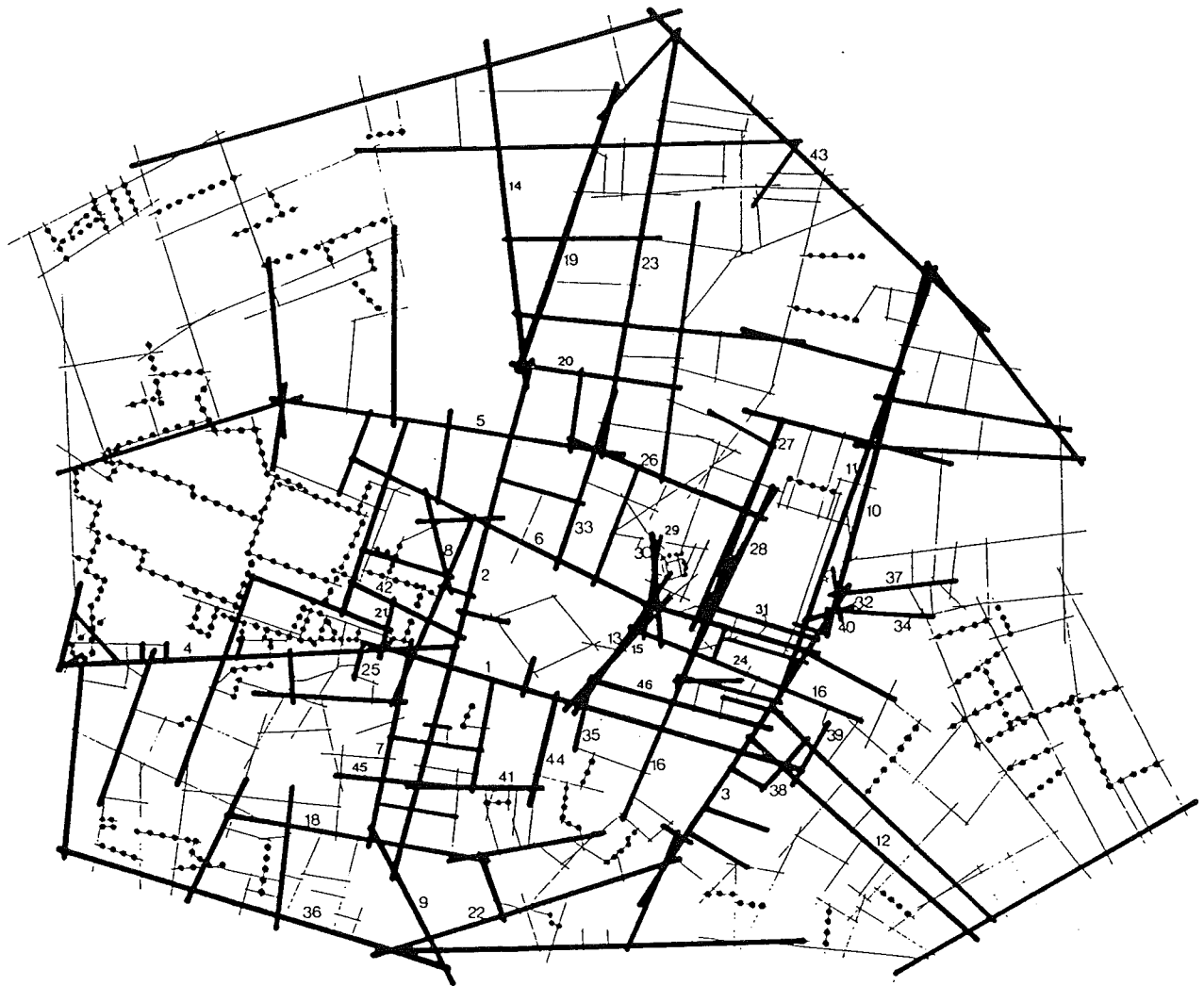


Figure 8i

Axial map of the Broadgate development, in its contextual area, as it will appear when fully complete - with the ice rink in operation. The 25% most integrated lines are shown in bold, with the first 10% numbered in the order of integration. The 25% most segregated lines are shown dotted.

relation) and then probability the likelihood that this could have occurred by chance. If we take the whole data set, including the lines which fall in areas which have very different characteristics to the Broadgate area (for example, the high rise area in the south east, and the street market area of Spitalfields/Petticoat Lane) then we find a reasonably strong correlation of .649 (prob. .0001). If however, we omit these different areas then we find the correlation at .837 is much stronger:

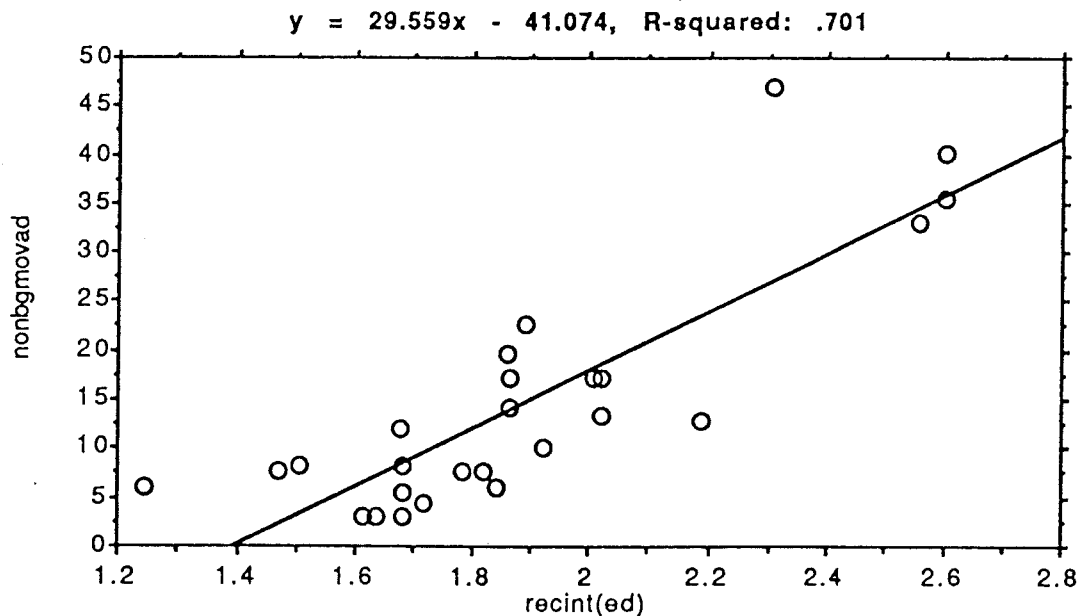


Figure 10

The highest circle is Bishopsgate, and its vertical distance from the regression line indicates the degree to which it overperforms for its integration value due to the local presence of attractors. Similarly, the circle markedly below the regression line (at an integration value of about 2.2) underperforms for its integration. This is the line leading from the Barbican to the north west corner of Broadgate. These results show that the pattern of movement in and around Broadgate is produced first by the grid configuration, and secondarily by area difference such as building heights and attractors. We may now consider movement within the Broadgate development.

Movement within Broadgate

Figure 11 is a map of Broadgate Phases 1-4 summarising the results of the October 1988 observation programme in the same way as **Figure 9** for the surrounding area. Again, the distribution shows certain dominant features. The most obvious is the strength of movement on the NW-SE diagonal, with both north and west entry/exit points. But it is equally

clear that all the spaces in and around Broadgate Square apart, from the south entry and the SE-NW diagonal, have low levels of movement. This is due to the fact that at the time the northern entry to the square was partially blocked, and offered only a narrow and tortuous route, and at the same time some of the lower level shops were still being fitted out and were not yet operational.

These low performing spaces affect the average movement rates for Broadgate as it was at that time quite adversely. At a mean of 9.84, Broadgate appears to be performing at a rather lower level than its surrounding area. However, this low level is entirely due to the low performing spaces on then lower level and to the east of Broadgate Square. When these are eliminated, the rate rises to 14.768, putting Broadgate above the levels of the northern sectors and below the levels of the southern sector, exactly as one might expect if Broadgate were merging into its surrounding area.

However, a more intriguing possibility emerges if we plot Broadgate and the contextual area on the same scattergram :

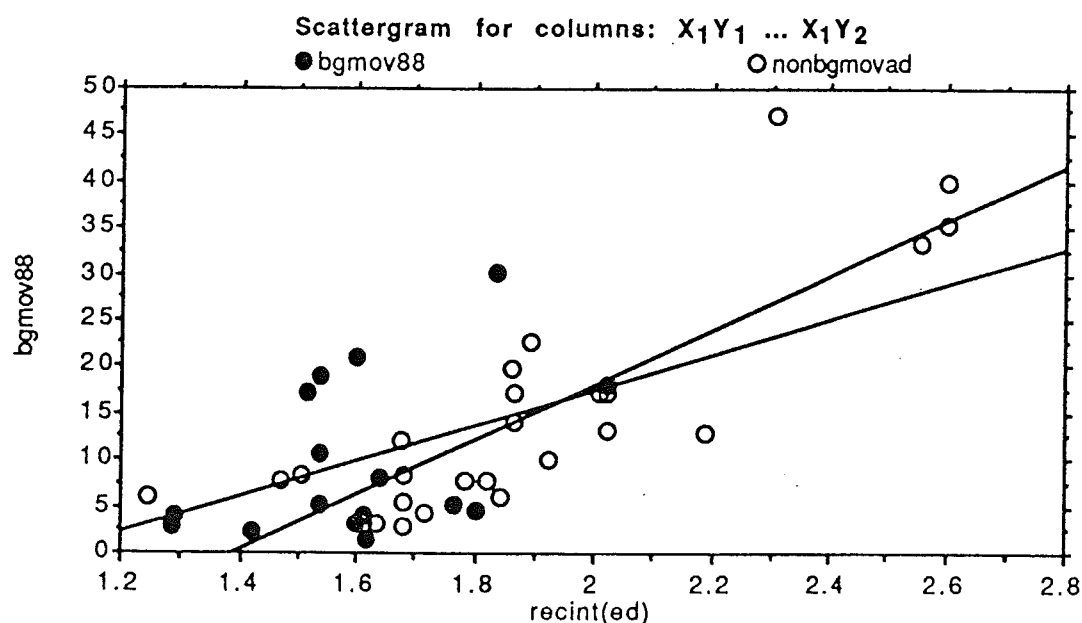


Figure 12

The black dots are Broadgate and the circles the contextual area. This shows that there is a split in Broadgate between the dominant SE-NW route spaces which are the black dots grouped in a line well above the regression line, and the Broadgate Square spaces where movement rates are markedly

below the regression line. This is shown clearly in **Figure 13** where the split in the distribution of movement in Broadgate is clear:

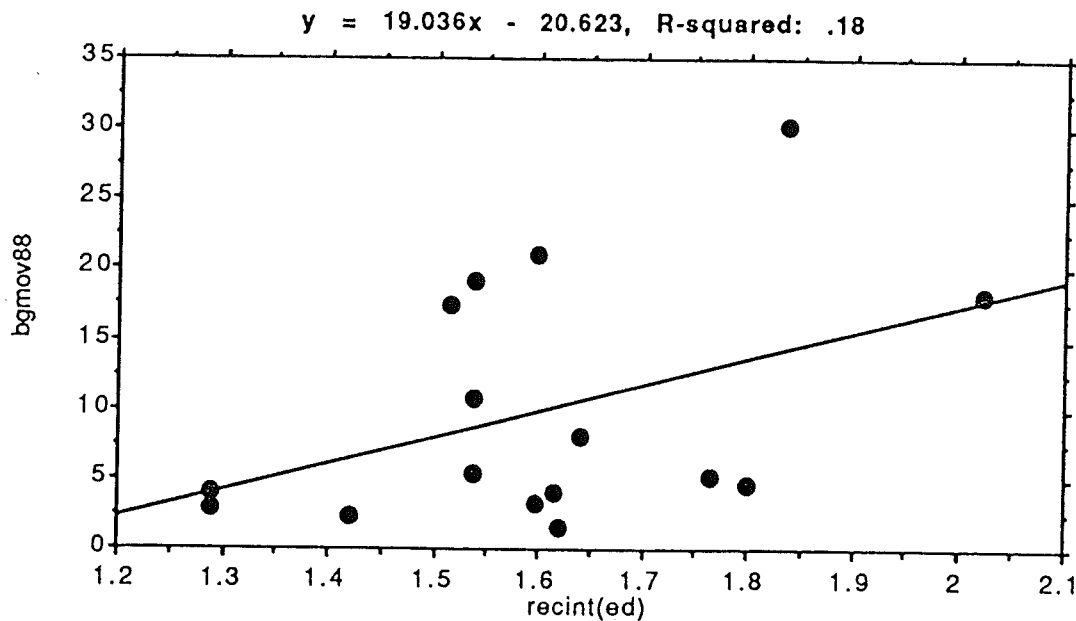


Figure 13

It was originally hoped that this would be clarified in the main 10 week observation period in the spring of 89. However, during that phase, although the ice rink and open space were operating and drawing significant numbers of people, basic movement rates were still affected by the fact the the northern entry was now completely closed for construction work, and some of the lower level shop were still being fitted out.

It was therefore decided that a further brief period of observation would be needed when all entrances were fully open and all shops let. This took place in January 1990 and was confined to the midday period, with a check at around 4 pm. Careful checking of rates for spaces unaffected by the opening of the northern entry, coupled to some checking of rates for the surrounding area, showed that the new observations could be reliably compared to the midday period for the October 1988 observations. **Figure 14** shows the new Broadgate movement observations:

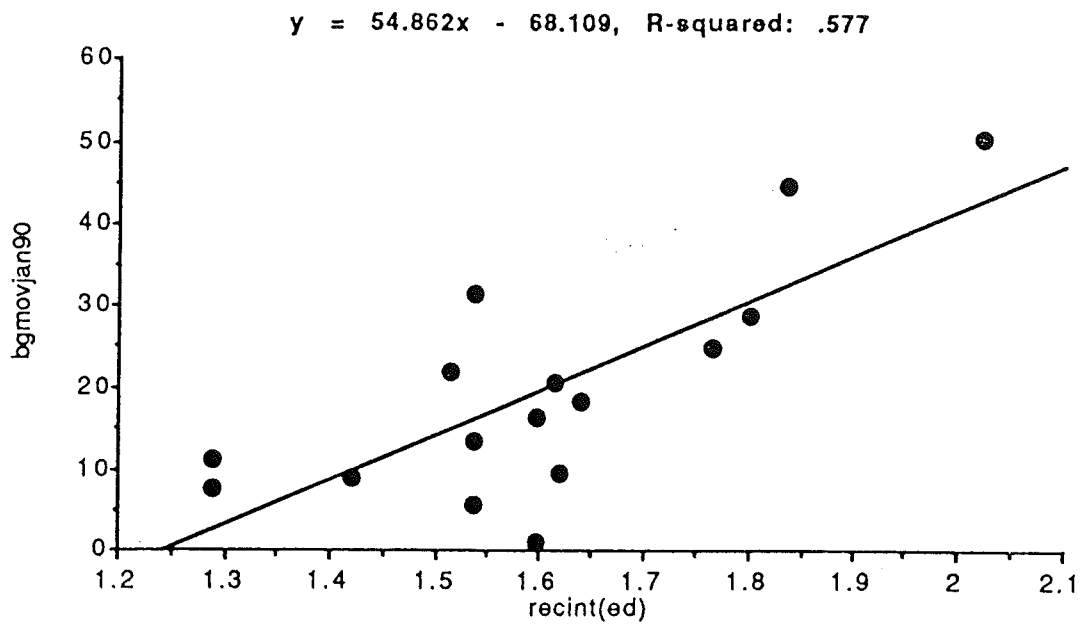


Figure 14

The string of high movement spaces above the regression line (those with more movement than would be predicted from their integration value alone) are the spaces on the dominant route. In Figure 15, by contrast :

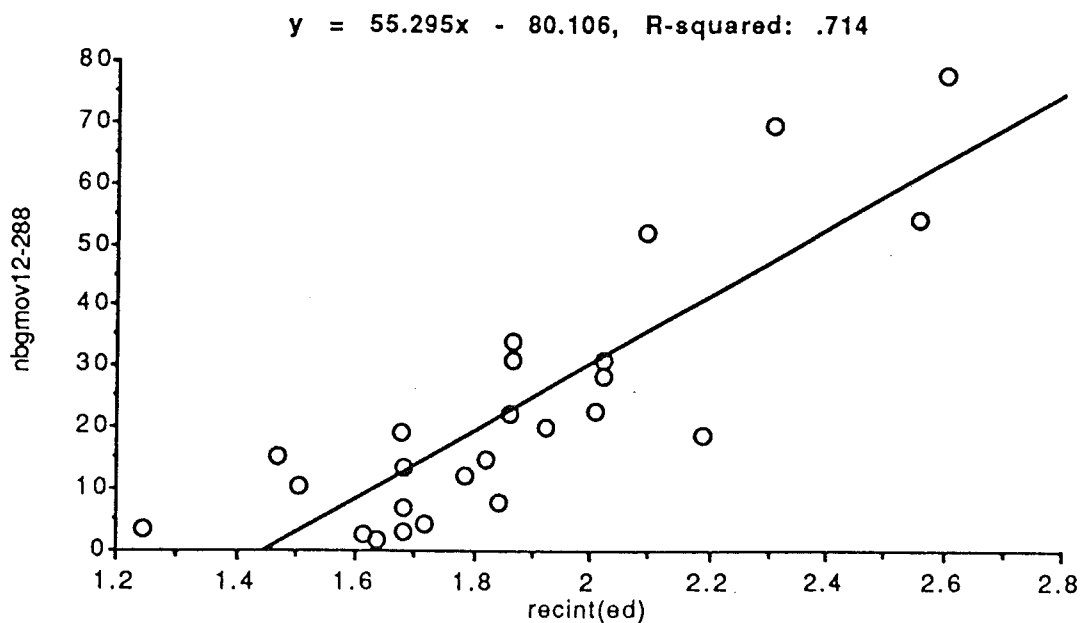


Figure 15

which is the area distribution, the high movement spaces above the regression line are the major shopping spaces. Figure 16 plots both on the

same scattergram:

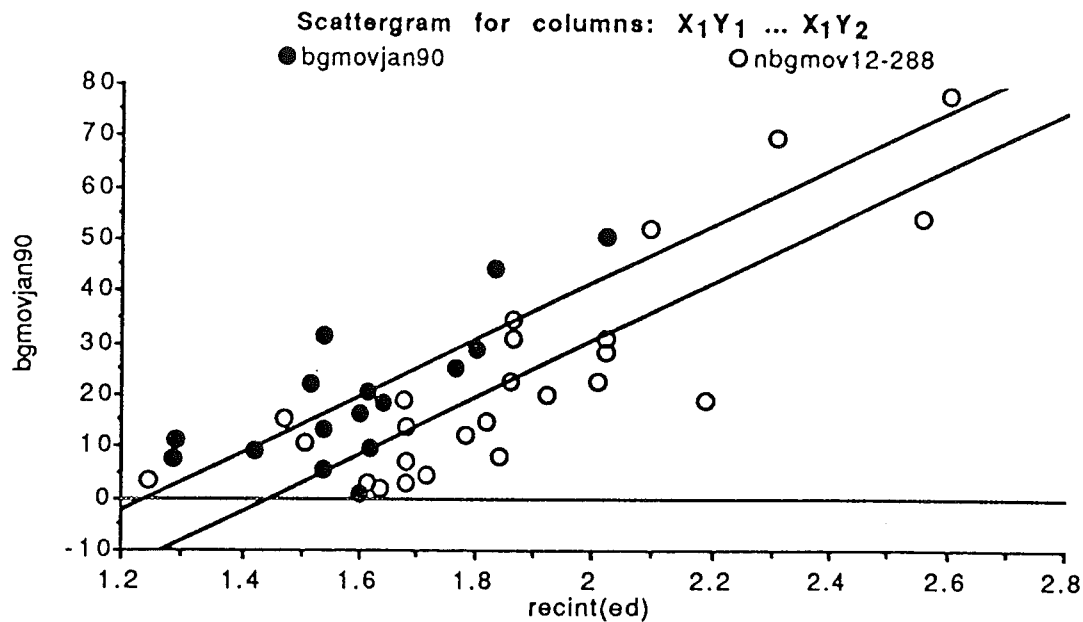


Figure 16

This shows that the regression line for Broadgate is exactly parallel to that of the contextual area, but lies consistently above it. This means that spaces in Broadgate are consistently getting higher levels of movement for their degree of integration than the surrounding area. Or, more simply, Broadgate is acting as a movement attractor over and above its relation to the area configuration.

This is not the same as to say that Broadgate has higher levels of movement than the surrounding area. In fact, they are slightly lower: 19.5 phm/m compared to 23.5 phm/m. However, the mean for the surrounding area is substantially inflated by the few shopping streets with near high-street densities, especially during the midday period when the observations were made. When these are discounted, the average for the surrounding area falls to 15.5, considerably below Broadgate.

It is normal for groups of shops to have a 'multiplier effect' on movement rates, which increases with the degree of integration. Shops on integrating lines will thus produce a greater multiplier effect than those in more segregated locations. Outside Broadgate, shops are grouped on the whole on integrating lines, and multiplier effects are proportionately high. In Broadgate, the shops are in relatively segregated lower level spaces, and the multiplier effect, while clearly present, is at a much lower level in terms of absolute numbers. Broadgate thus outperforms its contextual area in terms of levels of basic movement, but does not take advantage of this in terms of the multiplier effect of shops.

This does not mean that the shops on the lower level of the Circle are not working as attractors. On the contrary, they appear to be doing so rather successfully. The shops at the lower level are aimed primarily at the midday market, so if we take the difference between movement rates at 4 pm and in the midday period as indicative of the degree to which these shops are having a multiplier effect, then the effects are quite startling. In contrast to the shopping spaces outside Broadgate where movement rates typically increase by a factor of between 2 and 3 in the midday period (as do the main movement space across Broadgate), the two lines on the west-side lower route of Broadgate Circle multiply their movement rates by a factor of 10 over the 4 pm rate, and the two on the east side - where rates are at all time only half of those on the west side (almost certainly because the west side links to the main diagonal movement route across the site) - multiply theirs by a factor of 4. But these increases are, of course, from a base of very low movement rates, so that absolute numbers are still relatively low. These issues are discussed again below.

Stopping in Broadgate

Where people stop and spend time in Broadgate was studied in detail during the ten week observation period in early and late spring of 1989. Observations were confined to a three hour period in the middle of the day. During the first 5 week period in February-March, the ice rink was in operation; in the second 5 week period, the ice rink had been dismantled and the circle operated as an open space.

The technique of observation during this period consisted of observers marking the exact positions occupied by people (moving as well as static) on a plan, and repeating this 5 times during a period of 3 hours on a different day each week. This was intended to be more precise than the first observation programme. Whereas people tend to move in well defined lines, and all one needs to know is which line they are on, when they stop and spend time the exact location which they select is of key interest if the influence of design factors is to be understood. The static space use rates resulting from this observation technique are expressed in terms of absolute numbers per minute of observation time, unless otherwise stated.

To understand comparatively how Broadgate is performing, the frame of reference is not the immediate surrounding areas, as it is for movement, but the other open spaces of the City of London. Simultaneous studies of 6 other open spaces in the City and the two Broadgate squares were therefore conducted both during the initial October 88 observation period

and during June 89. For obvious reasons, these simultaneous studies could not be carried out during the period of intensive observation of Broadgate during the spring of 89. What follows draws on all three phases of study. The raw data from these three phases of study are set out in **TABLES D, E, and H. Figures 17a-d** present a visual summary of the observation of space use during the spring period. **Figure 17a** shows the average one minute picture of where moving people are found and in what numbers and locations during the early spring period, and **Figure 17b** does the same for the late spring period. **Figure 17c** shows a similar averaged picture of static people per minute during the early spring period, and **Figure 17d** shows the same for the late spring period. These diagrams give a very easily grasped yet statistically robust picture of space use and movement in Broadgate at that time. The data summarised in these diagrams is given in more detailed numerical form in **TABLES F and G**, with temperatures and notes on prevailing weather during the observation period.

The most striking things about **Figures 17a and 17b** is how little difference there is between either the densities or locations of moving people as the weather improves. The same pattern appears in both phases. The SE-NW diagonal route dominates. There is a marked absence of movement in the east and north of Broadgate Square, though this is undoubtedly due to the fact that the north entry was blocked. Indeed, it is a matter of interest that the elimination of a single line of movement can have such an extensive and direct effect. Other markedly low levels of movement are found on the SW-NE diagonal in Finsbury Avenue Square, on the south side of Finsbury Avenue square, and in the low level spaces around Broadgate Circle - though the latter would have been affected by the fact that shops were still being fitted out. It is striking that the pattern of high and low levels of movement does not change significantly as the year advances and the weather becomes warmer.

The numbers of people stopping in Broadgate does however increase as the temperature rises. **Figure 18a** plots the temperature during the observation period against rates of people stopping:

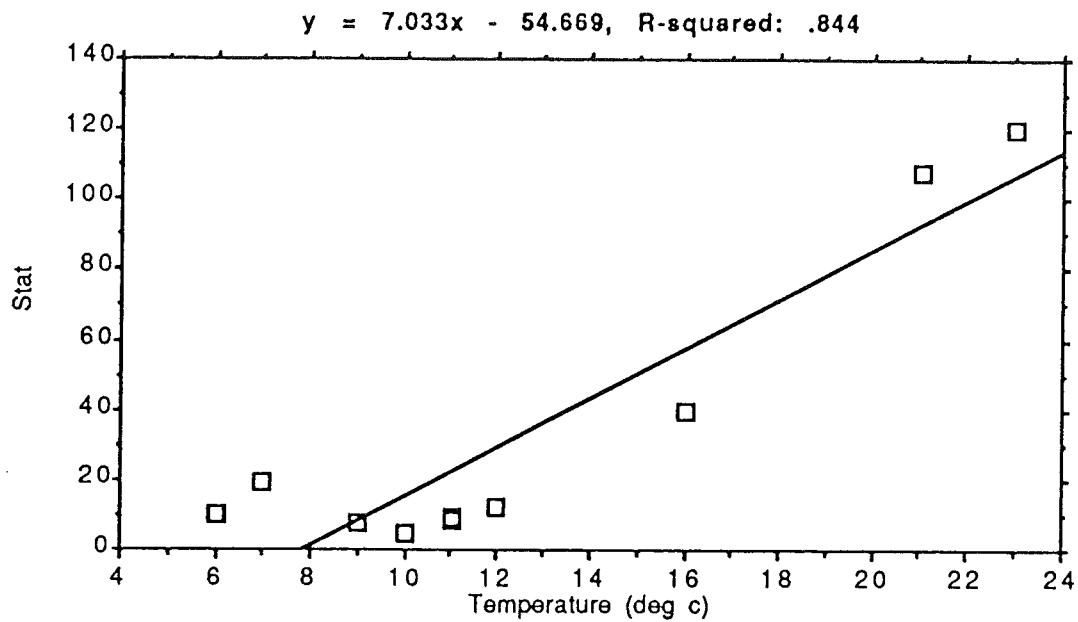


Figure 18a

whereas **Figure 18b** plots the rate of increase in moving people with temperature on the same scale :

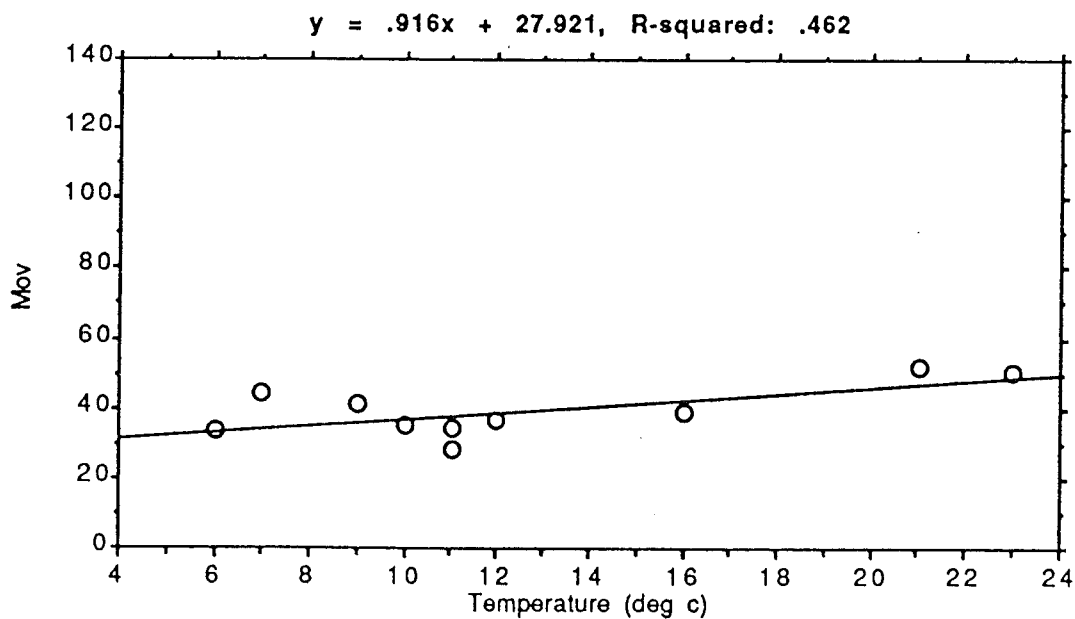


Figure 18b

Specialists will recognise the static increase as a logarithmic function, which will be linearised by taking the logarithm of the rates of static occupancy. This turns out to be the case. If then we take out the effects of

rain i.e. eliminate the two rainy days, and also the day which was very cold but sunny, then we have **Figure 18c**, showing clearly that the increase in static use with temperature is a log function, but one which can be disturbed by the appearance of sun during cold weather, or rain in warmer weather :

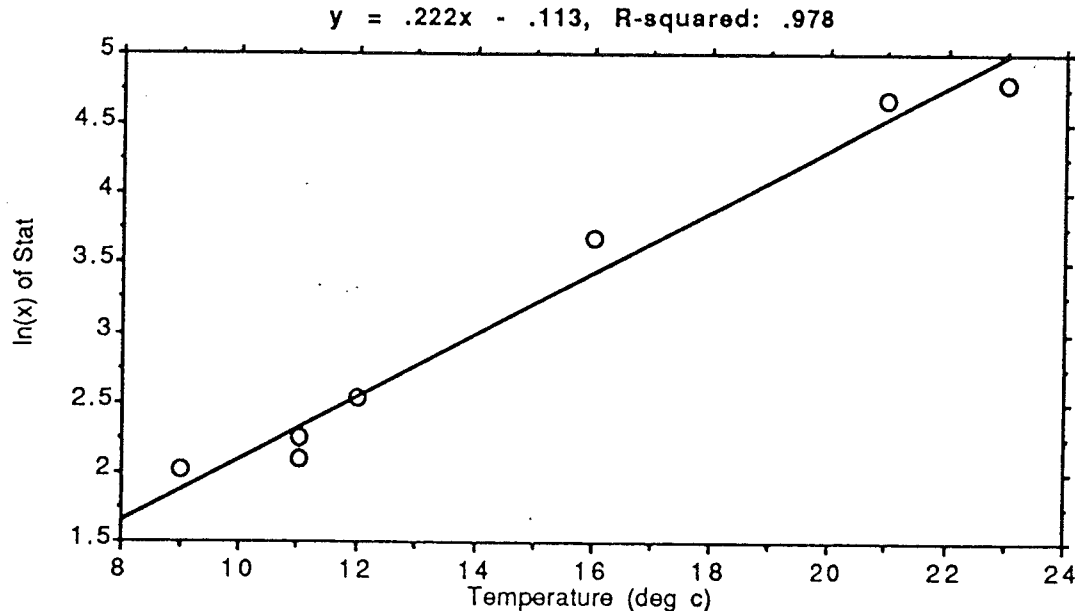


Figure 18c

The spatial distribution of stopping people in the squares has a marked pattern, which develops with increase in numbers. In both early and late periods in Broadgate Square, stopping people locate almost exclusively around the Circle, with very few elsewhere. The area underneath the colonnade structure tends to fill up first, and stay filled, with a bias towards the spaces on the west side. This is most apparent on days when the weather is relatively poor and the overall number of people stopping is low. The seats directly around the rink/circle tend to fill up around the peak lunch-time period, with both sides being equally used. The stairs leading to and from the square in the north, south and west are also very popular for sitting down, as is the space outside the then recently opened lower level wine bar. In contrast, the bridge at the south end of the Square attracts as little static use as the east, north and south east spaces away from the Circle perimeter.

In Finsbury Avenue Square, however, stopping locations in the early spring are strongly confined to the north west corner outside the pub and above the main area of the square. There is very little tendency for stopping to spill over into the lower main area of the square. This seems to be a

function of the rather strong boundary created by the change of level down into the main square. An easier route down into the square would lessen the intensity of the concentration in the north west corner where there is also a considerable amount of movement. In the late spring, the much larger numbers in Finsbury Avenue Square spill over into the main body of the square to give a fairly even spread, which may be helped by the very low levels of movement across both diagonals of the square.

On fine days in Finsbury Avenue Square, there is a definite order in which the spaces fill up. The spaces which are occupied first, and which receive the highest level of use are those outside the pub (for both sitting down and standing up), and the adjacent area around the fountain (mainly sitting down) in the north-west corner of the square. The central part of the square, including the seating blocks in the middle is the second area to become occupied, and this is followed by the peripheral steps to the cobbled zone. Finally the landscaped area around the south east corner, especially the planting blocks facing outwards from the square tends only to be used on exceptionally warm days after the rest of the square has become completely filled. The overall sequence in which the square is filled up is therefore north west to south east. It is noticeable, incidentally, that as the body of the square fills, fewer and fewer moving people cut across the north east corner of the square on the main diagonal route through Broadgate.

It would be reasonable to conclude from this description that the pattern of static use in the squares is dictated by the location of attractors rather than by spatial properties. But a more careful look at spatial properties which have in the past been shown to correlate with static occupancy of space shows that spatial properties may after all be involved. The properties are, however, a good deal more complex than the linear patterns which generate movement. Movement, we might reflect, involves origins and destinations, and the route taken between them. It is natural that the pattern of movement should be related to the large scale grid structure of the city. However, static activities have the opposite property. Having arrived at a square by using the linear properties of space, linear structure becomes less important to the person who has stopped, and other, more localised, visual properties of space experienced by the stationary person become of more significance.

An interesting clue to what these spatial properties might be is given by the activities people engage in, when they are stationary. It is noticeable that, even when people are in conversation, they are watching - other people who walk past, other people who are stationary, the landscape and

buildings, or events that have been specially staged. It is reasonable then to expect that the locations people choose may be related to their importance in visual terms.

From this point of view, the results of the observations are suggestive. For example, the south west corner of Broadgate Square, directly above the bookshop, is a popular stopping point for people first entering the square. This may be due to this being the first location where the whole of the square may be seen. Similarly, in Finsbury Avenue Square it is the space outside the pub which gets filled first, and always has the highest numbers of stationary people outside. This has strong views of the whole of the square, penetrating partly into Broadgate Square, with views towards Wilson Street and the whole length of Finsbury Avenue.

It would be easy to assume that it is the presence of the pub which dictates this particular pattern of location. But if we make a comparison with the nearest public house outside Broadgate, the one on the corner of Wilson Street and Sun Street, which has limited views that extend only down these streets, then we find that during the whole of the 'summer' observation period when there were an average of 80.72 people in the north-west corner of Finsbury Avenue Square, there were only an average of 2.4 people outside the Sun Street pub. It seems unlikely that this 34 fold difference can be explained without invoking the distinctive characteristics of the spaces - the more so since it is common in the City for pubs to generate considerable outside drinking even in moderate weather.

A quantifiable representation of the degree to which a location is visually strategic is the 'convex isovist'. This analysis is made by first breaking up the area within the development into the fewest and fattest convex spaces, that is into the fewest spaces in which all points are visible and directly permeable to each other. An isovist is then drawn from the boundary of each convex space by simply outlining the total area which can be seen, and accessed directly (along the line of sight), from that space. A selection of isovists for Broadgate are shown in **Figures 19a and 19b**. Convex spaces are shown in cross shading, with the isovist shown in black.

Figure 19a shows the isovist from the north-east corner of Finsbury Avenue Square. It graphically illustrates the way in which more than half of the Square, plus the connections to Finsbury Avenue Square and the north exterior can be seen from this location. However a much more strategic location is that adjacent to the pub, shown in **Figure 19b**. The isovist indicates that from this space almost all of the square can be seen,

together with glimpses into Broadgate Square, and views down to Wilson Street.

A simple count of the number of other spaces visible along the isovist provides a numerical expression of the strategic value of each convex space. A convex maps of the development, with and without the ice rink are shown in **figure 20a and 20b** with the count marked in the centre of each space.

The levels of visual connectivity closely follow the pattern of space use by static people. The area outside the pub is the most strategic within the development with 27 other spaces being directly visible from it, and the central area of Finsbury Avenue Square is only slightly less strategic with 26 spaces visible. Spaces on the western side of Broadgate Square, feature equally strong. By comparison spaces on the eastern side of the square, where there are few stationary people, are poorly connected, as are the lower level spaces beneath the ice rink.

The extent to which this picture of visual connectivity is an accurate reflection of real use patterns is demonstrated graphically in **Figures 21a, 21b and 21c**. In both instances spaces with very low or zero levels of stationary occupation have been excluded from the calculation, since only spaces where people consistently stop are of interest. For the first five weeks this was taken as spaces with a mean occupancy of less than .3 of a person during the observation period, and for the subsequent five weeks, when average occupancy was four times higher, it was taken as a mean of less than 1.2 persons.

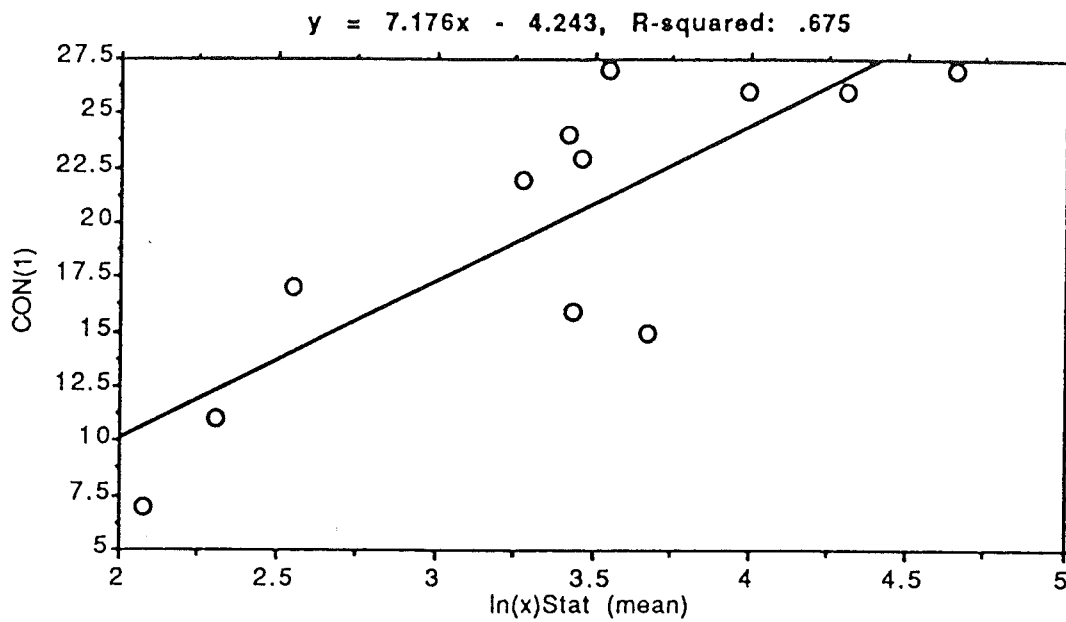


Figure 21a

The scattergram for the first five weeks shows a strong relationship, with a correlation of .821 (prob .0011). However the scattergram for the second five week period, **figure 21b** below, shows a much weaker relationship.

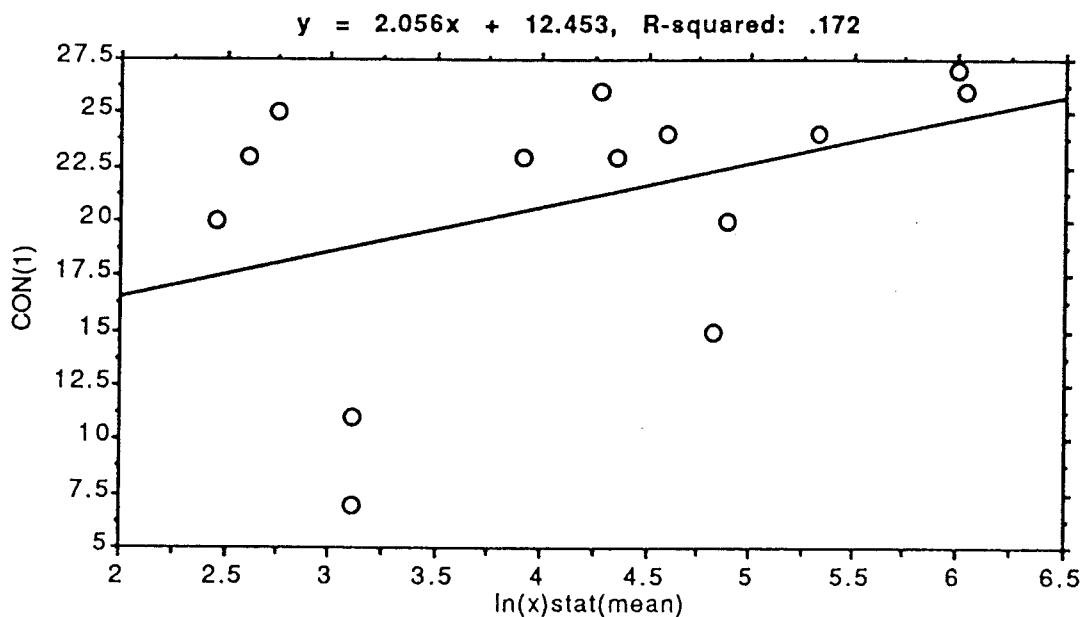


Figure 21b

It is noticeable, however, that three additional spaces have now entered the calculation, visible on the extreme left of the scattergram - indicating that they have the lowest levels of static use. Two of these spaces are in

fact, adjacent to the main pub space in Finsbury Avenue Square, and constitute the overspill when that space becomes fully occupied. The third space is located in the south west corner of Finsbury Avenue Square and again constitutes an element of overspill, which occurs only when the rest of the square becomes totally occupied.

When these three spaces are excluded a stronger relationship becomes evident as shown in **Figure 21c** below:

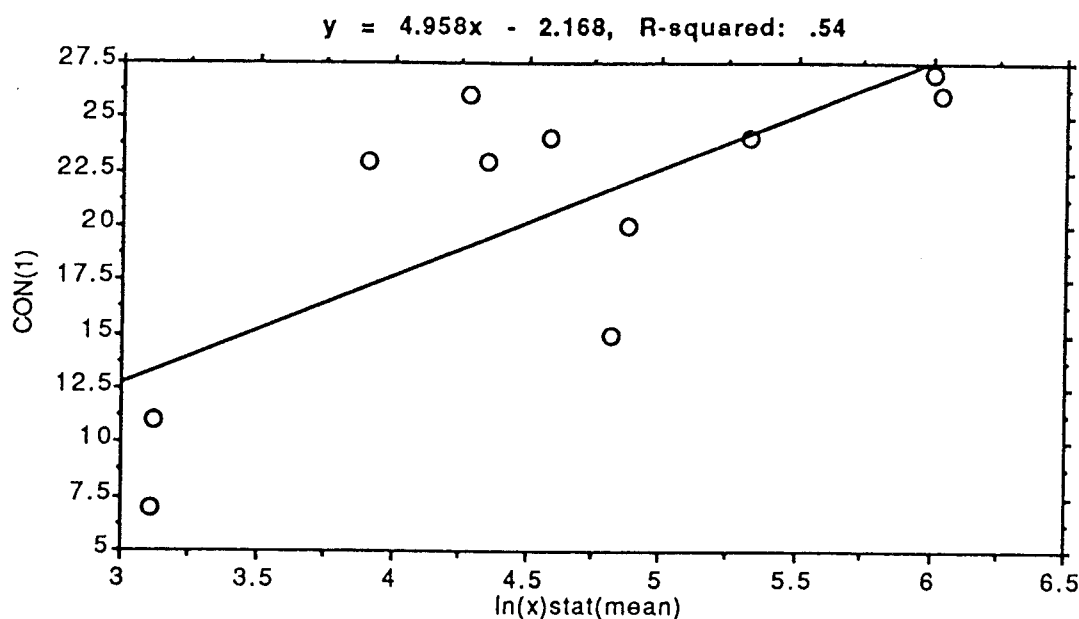


Figure 21c

However this is not as strong as before due to a combination of two factors: the presence of large numbers of stationary people on the steps to the arena, which in the context of the development as a whole are comparatively less strategic; and the saturated use of spaces to the west and north of the arena, to the point where there is no more room for additional static people. Both of these effects are due to the presence of events taking place within the arena. It is worth noting, however, that the highest use spaces (on the extreme right of the scattergram) are both within Finsbury Avenue Square - firstly the central area of the square and secondly the space outside the pub - both occurring without any special event .

Comparing Broadgate

Similar properties may be invoked in comparing the absolute numbers using the Broadgate spaces compared with other open spaces in the City. Earlier study had suggested that the numbers choosing to stop and make informal

use of a space was a function of the numbers and degree of integration of lines of sight and access passing through the body of the space. We called this the 'strategic value' of the space, and calculated it formally by summing the (reciprocals of) the integration values of all lines passing through the body of the space, but not those which passed adjacent to it. Although a relatively segregated and unstrategic space could be successful if it was small, for a larger space to generate the level of informal use that would make it appear well used, the strategic property was essential.

The spaces to which the Broadgate spaces were to be compared were selected for their variety as well as their different levels of apparent success. The location of these spaces is shown in **Figure 22**. They were:

1. Royal Exchange Buildings. This is a long and comparatively narrow space located between Threadneedle Street and Cornhill. A number of small shops are located on the west side of the space, beneath the Royal Exchange. Parts of this space experience overshadowing from adjacent buildings. There is no natural greenery, and the space is adjacent to two busy traffic arteries.
2. Bow Churchyard, is a small approximately square space located just off Cheapside, in the centre of the City. The space is enclosed by modern buildings on two sides and Christopher Wren's church on the other. The centre of the square contains several mature trees.
3. North Guildhall Court, is a large modern space, located directly behind the historic buildings of the Guildhall. The space has been carefully sculpted and contains a fountain at one end, but no plants or greenery.
4. Love Lane Corner. This is a small space which partly occupies the site of war damaged buildings, at the corner of Love Lane and Aldermanbury. It has the character of a small well tended garden with grass and paved areas. Several trees and hedges provide shading and visual enclosure.
5. St Pauls Churchyard, to the south of the cathedral is another comparatively small space. It is surrounded on two sides by busy roads - Cannon Street and New Change, with a parking space for tourist coaches close by the third side. It is a comparatively simple space. A central lawn is surrounded by a ring of benches, which are partially - but not visually - shielded from surrounding streets by hedges.
6. Old Change Court is located on the opposite side of Cannon Street. This is a large paved area, with a good view of St Pauls. Part of the square

contains elaborate landscaping and carefully arranged seating. The south perimeter is fronted by a number of shops including a travel agent and a wine bar. Modern office buildings form the east and west elevations.

Observations of levels of space use were carried out on two occasions, in October 1988 and again in June 1989. On each occasion all of the squares were observed simultaneously to avoid differences in weather.

Observations took place during the lunch time period, from noon until three p m, when stationary activities are at their highest, and avoiding the effects of rush hour movement. Each space was visited at approximately 30 minute intervals by a research assistant. Upon arrival a count was made of the total number of stationary and moving individuals present during a one minute period. In the case of larger spaces, such as Broadgate, where it is impossible to observe the whole of a space simultaneously, the area was divided up into a number of sectors, which were then observed separately for one minute each.

TABLE H summarises the results of these observations, and also gives the size of each of the spaces in square metres. This has been taken as the area in which the public can move freely, and excludes structures, landscaping and areas where access is barred. The table shows that the new Broadgate Square is by far the largest space within the sample, although this is not readily apparent on the ground, due to the spatial and formal breakup of the space. Finsbury Avenue Square comes in at fourth largest, and marks the transition between spaces which can be considered large (over 2,000 sq metres) and small (around 1,000 sq metres or less).

These figure show a very simple and elegant result, one which duplicates, yet adds to, the findings of the previous study.

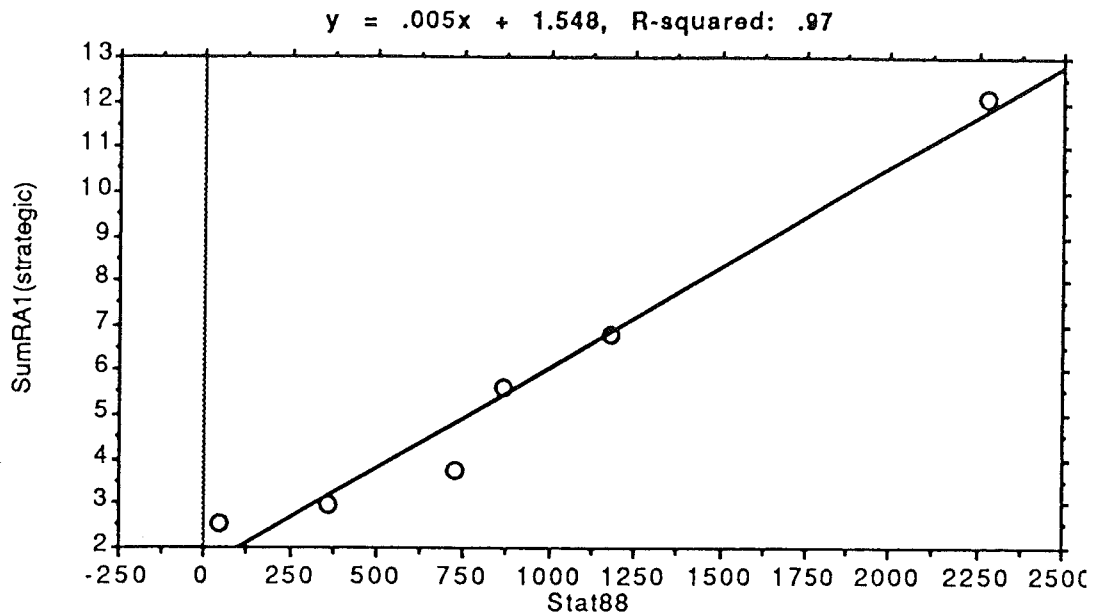


Figure 23

Figure 23 shows the relation between the 'strategic value' of space and their rate of informal use for the October observation period. This confirms the result of the previous study to a remarkable degree. **Figure 24** then adds in the two Broadgate squares:

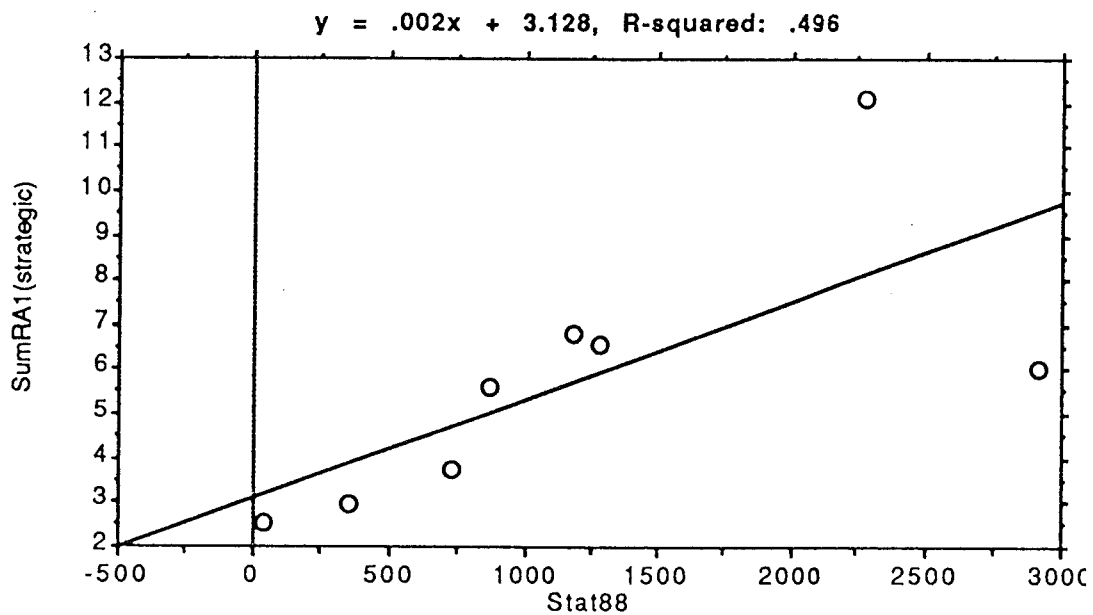


Figure 24

showing that while Finsbury Avenue Square falls exactly on the regression line, Broadgate Square performs at a much higher level undoubtedly because it is the only space which acts as an attractor other than in the summer period.

This is confirmed when we look at the pattern of informal use during the June 89 observations:

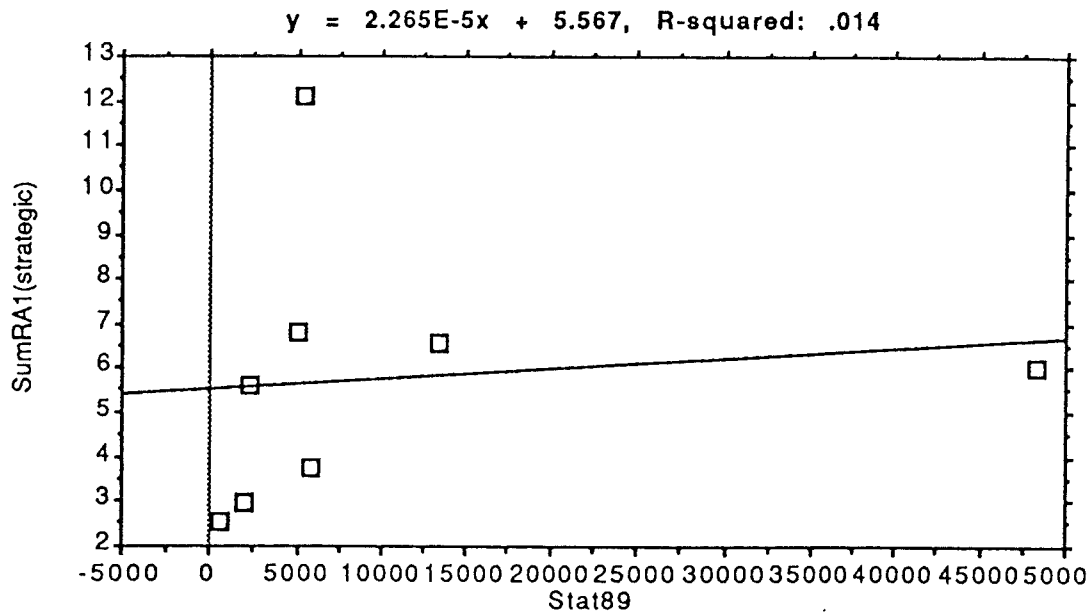


Figure 25

This shows that the Broadgate Square effect is even stronger, but also that the appearance of attractors has also radically increased the use made of other spaces. The top performing space without attractors, St Paul's Churchyard, is matched by Old Change Court which by then has a wine bar with outside seating in successful operation, but St Paul's Churchyard itself remains at a similar level having only 'unprogrammed' use. The top performing space without 'programmed' attractors as we have defined them (beginning with owned seating tied to a specific facility) is Finsbury Avenue Square, with a markedly higher performance than any other space.

These figures do not as yet take account of the size of the open space. In **TABLE H** the rates of occupation by static people are calculated as numbers of people per 100m² using two definitions of size: first, in relation to the absolute (or total) size of open space within its boundary; second, in relation to the effective area of space used for stopping.

The absolute figures suggest that both Broadgate Square and Finsbury Avenue Square are only average performers during the winter, for the obvious reason that they are substantially larger than the other open spaces, and, as we have noticed, static occupation tends to focus in certain areas - in the north-west corner in Finsbury Avenue Square, and around the Circle in Broadgate Square. However, when the figures are recalculated in

terms of the effective area used for winter static occupation, Finsbury Avenue Square and Broadgate Square emerge as by far the highest performers.

This confirms the intuitive impression that static use is relatively dense in both spaces even during the winter. However, the feeling is different in the two squares. As we have already noted, Broadgate Square is bigger than Finsbury Avenue Square, but feels smaller because of the effect of the 'circle inscribed within a square'. The concentration of static occupation around the circle seems natural, and the rather large areas of space between the Circle and the buildings do not seem to be unoccupied. They lend a feeling of space to the densely occupied areas.

In Finsbury Avenue Square, the concentration in the north-west corner can sometimes make the body of the square feel under-occupied during the winter months. But during fine weather, when the body of the square can fill completely, the density of occupation and the sense that it is all unprogrammed and informal, creates an atmosphere which verges on the celebratory. It is difficult to see how this could happen during fine weather without some cost in less good weather. The sheer scale of the square seems a vital component of the almost flamboyant expression of urban enjoyment that can be found during the summer months.

The answer might be to make certain minor landscaping changes which would make movement from the north west 'platform' into the body of the square below the fountain easier. At present, it requires a definite trip to make the transition. Ramping down on both sides of the fountain into the lower level would not reduce the definition of the north west corner, but would make it more natural for people to spill over into the area on the lower side of the fountain. Most of the landscaping in the square, however, works well for creating an easy interface between static and moving people.

The comparative studies thus show that Broadgate Square and Finsbury Avenue Square are, each in its own way, the top performing spaces in the City. Broadgate Square is the strongest space in which specific attractions play a role in generating levels of use, and Finsbury Avenue Square is the strongest in informal use. In both cases, success is, as we have seen, closely related to spatial design.

The Broadgate spaces as attractors

In order to try to find out how successful Broadgate was in attracting

people from other parts of the City, a study was conducted in June 1989 in which 50 static people in each of the two Broadgate squares and 50 in each of the other 6 City spaces were asked where they had come from to be in the square, and where they would be going to afterwards. The study was as near 'simultaneous' as could be managed, in order to eliminate any bias due to weather.

Not the least interesting fact to arise from this study was that 81% of the people who had stopped in Broadgate were from outside the development, 78% in Finsbury Avenue Square and 83% in Broadgate Square. We feel this is of great importance to how we conceive of urban spaces. A public space can never really work simply by being identified with, or 'belonging to', those who occupy the buildings around it. A truly public space is one in which 'strangers' come in numbers and feel at ease.

This implies that the catchment area of a space may be significant to its success as public space. Accordingly, the 'origins and destinations' data was used to calculate the mean distance that people had come to be in each of the 8 spaces studied. The results are included in **TABLE H**. This shows that the Broadgate spaces, on average, attract people from larger distances than the other spaces in the City with a mean distance of 439 metres, and with Broadgate Square rather higher at 454 metres than Finsbury Avenue Square at 423 metres. The only space to compete at that level is Bow Churchyard, which is of course immediately adjacent both to Cheapside, the main shopping street in the area, and Bow Lane, the second most important shopping street. Of the other spaces, only St Paul's Churchyard has a mean distance above 300 metres (353 metres). All the others are in the two hundreds.

Because of the importance of the axial dimension of space in determining movement patterns, we also calculated the mean axial complexity of the simplest routes that people could have taken to arrive in the 8 spaces. The results are again set out in **TABLE H**. The figures show that people are prepared to make far more complex journeys to come to stop in Broadgate spaces than any other space in the City. This also, of course, has the implication that it cannot be simply be 'natural movement' that is producing the high levels of people stopping in Broadgate. The figures show beyond doubt that Broadgate is working as a relatively long distance attractor in the City.

Review and conclusions

The evidence we have assembled here thus shows that Broadgate works on

all three criteria for public life in public space : it has natural movement; it generates significant levels of informal use; and it has major attractors. Moreover, it relates all three in such a way as to make Broadgate a major attractor for the City as a whole.

All aspects of this success are affected by spatial design. The continuous movement through Broadgate's spaces is directly a function of how the spatial layout has taken advantage of the structure of the existing urban grid, its attractors and its patterns of natural movement. The high levels of informal use are influenced by the availability of strategic locations, close to, but set aside from, lines of movement, yet having strong visual connections through other spaces. Major attractors are located in such a way as to relate naturally and easily to movement and informal use. As a result of the way all three work together, Broadgate seems a public space, and attracts people to it from greater distances accordingly.

More specifically, the data show that:

1 - Broadgate both integrates spatially into the surrounding area and improves the overall spatial integration of the surrounding area;

2 - Broadgate at ground level has rates of natural movement which are on a par with, or better than, the levels in the surrounding area. There is thus no 'ghetto effect' by which natural movement from and to the surroundings is reduced or channelled. If anything, Broadgate has a positive multiplier effect on movement;

3 - The two squares in Broadgate have generally higher levels of informal use than any other urban space in the area of the City of London studied, with an average in June of 483 static people per minute count in Broadgate Square and 164 per minute count in Finsbury Avenue Square;

4 - Broadgate Square is the most successful attractor space in the area, producing the largest multiplier effect from programmed events;

5 - Broadgate's public space attracts people from greater distances than any other public space studied, with an average distance walked of 439 metres, in contrast to an average of 303 metres for other spaces;

6 - 81% of people stopping to spend time in Broadgate work outside Broadgate.

More simply, Broadgate is a genuinely public space, working in a public

way.

There are three caveats:

1 - first, the concentration of retail mainly in the rather segregated lower level of Broadgate Circle means that the shops depend almost wholly on attraction, with little assistance from natural movement. They must accentuate their dependence on midday trade, and increase both trading risks and pressure on prices. In contrast, the single outlet at ground level within the main squares - the pub in the north west corner of Finsbury Avenue Square - lies on important movement lines, and, with the assistance of the visually well connected external space, plays an indispensable role in keeping the square populated. There are other ground level locations which are strategically almost as strong: the south east corner of Finsbury Avenue Square; the north section of Broadgate Square, on either side of the northern entry; and the south east corner of Broadgate Square. All these spaces lie close to movement, but are a little removed from it and in fact have little movement or static use at present. At the same time the spaces have strong visual strategic values which suggests a potential to generate static use in a similar way to the existing pub in Finsbury Square.

2 - second, there is a case for modifying the detail of the generally successful landscaping of Finsbury Avenue Square to make an easier transition from the upper level north western space outside the pub into the main body of the square. The simplest way to achieve this would be to remove two sections of the low walls on either side of the fountain, while preserving the main part of these walls for sitting, and ramp down. This minor change would make it much easier to use the main body of the square as an extension of the densely used pub space, without reducing the definition of either space.

3 - third, it has not yet been possible to study Broadgate Phases 1-4 fully operational, as now, and with the open space in the circle rather than the ice rink. Were this study (it would take a matter of days) to be carried out, we believe it would lead to a suggestion to make a small but significant modification to Broadgate Circle. At present, the changes in level in moving on the south-north axis through the Circle mean that the solid sides of the bridge across the southern side of the Circle act as a strong visibility barrier. For example, while the ice rink is in operation, it prevents a view of the skaters from Eldon Street, presenting instead a puzzling view of moving abdomens. We feel that from many points of view the replacement of this solid element by an element which permitted the

maximum visibility though it would both add to the visual excitement on which we believe the success of Broadgate partly depends, and at the same time improve the intelligibility of the south-north axis as a route.

Finally

These are very minor suggestions to make on a development as complex and ambitious as Broadgate. The fact is that from a spatial point of view the architects have got a great deal right. It would have been easy to design unsuccessful open spaces in Broadgate, and add to the 'urban desert'. As it is, the designers have got so much right that one wonders how anyone could have ever got so much wrong. Broadgate shows, in effect, that it *is* after all possible to design good public urban spaces in London in the late twentieth century.

Broadgate offers also a number of specific lessons. First, office areas can be and should be permeated with space that is genuinely public and strong in natural movement if they to add to the quality of urban life and at the same time add to the attractions a development has to offer to potential tenants. Broadgate should 'de-ghetto-ise' our thinking about new developments in inner cities. Public life in public space is possible, and it is good.

Second, individual 'squares' and other major spaces must be designed spatially with great care, to ensure that each has the right strategic relationship to the pattern of the grid as a whole. Care must be taken to ensure that natural movement, the generation of informal use and the presence of attractors are all in spatial symbiosis. Only when all are present does a real sense of urbanity arise.

Finally, Broadgate shows that it is time to be optimistic about urban development. Broadgate works, and in working it gives the lie to those who oppose the building of modern squares, either on the ground that the unsociable English will never use them, or because architects cannot design them.

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Figures

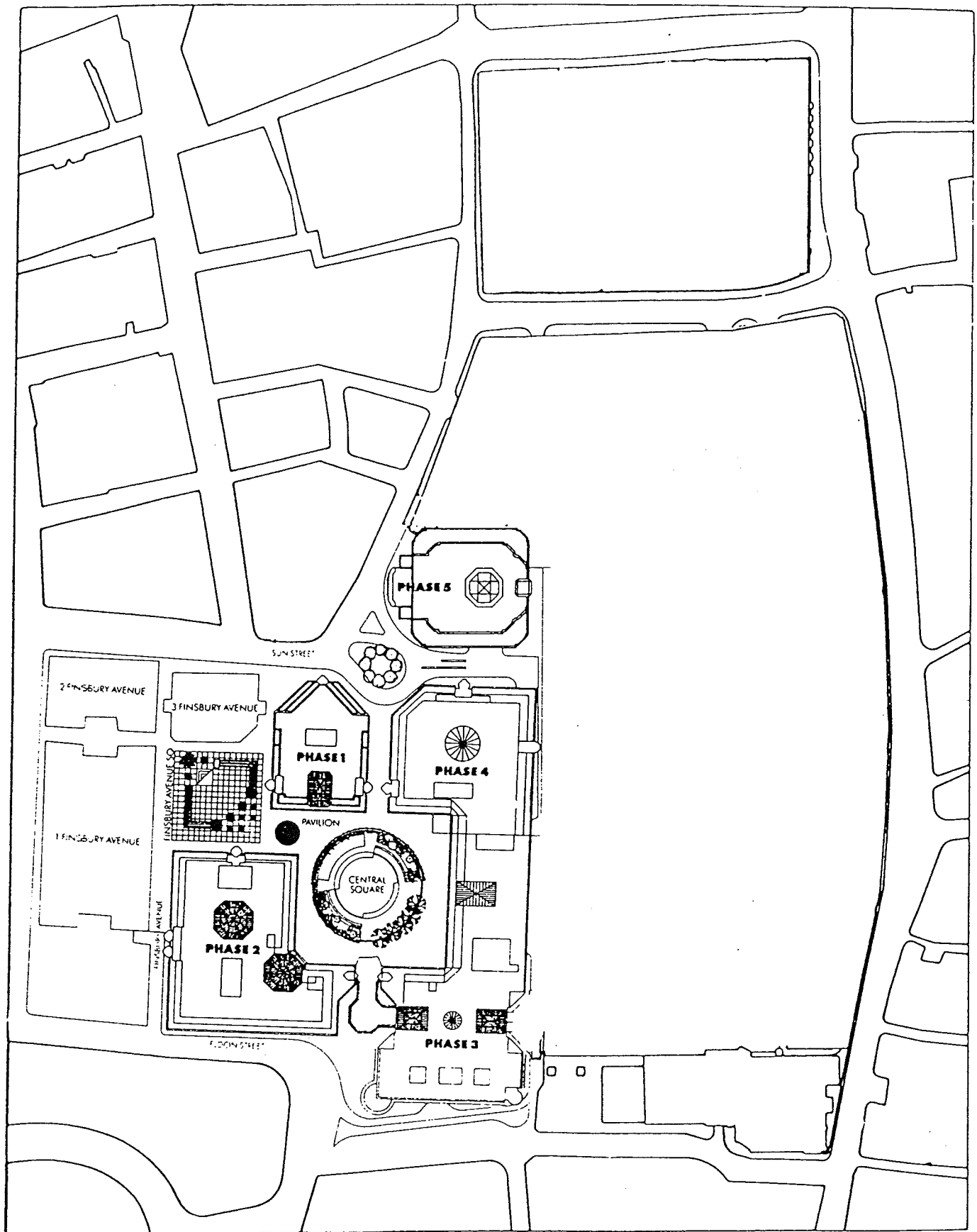


Figure 2

General plan of the Broadgate development showing those phases which are the subject of the present study.

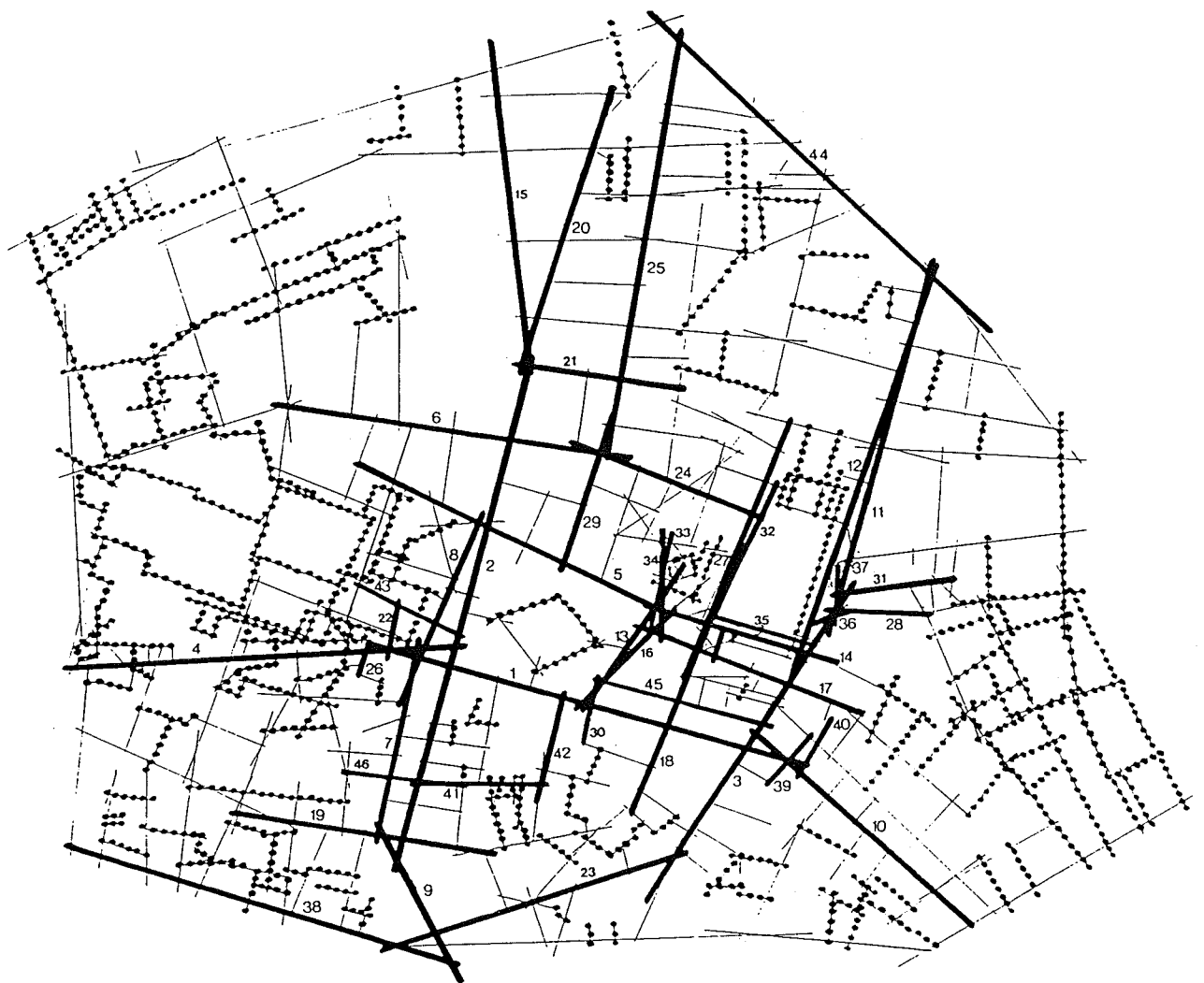


Figure 8j

Axial map of the Broadgate development, in its contextual area, as it will appear when fully complete - without the ice rink and free access across Broadgate Square. The 10% most integrated lines are shown in bold, and are numbered in the order of integration. The 50% most segregated lines are shown dotted.

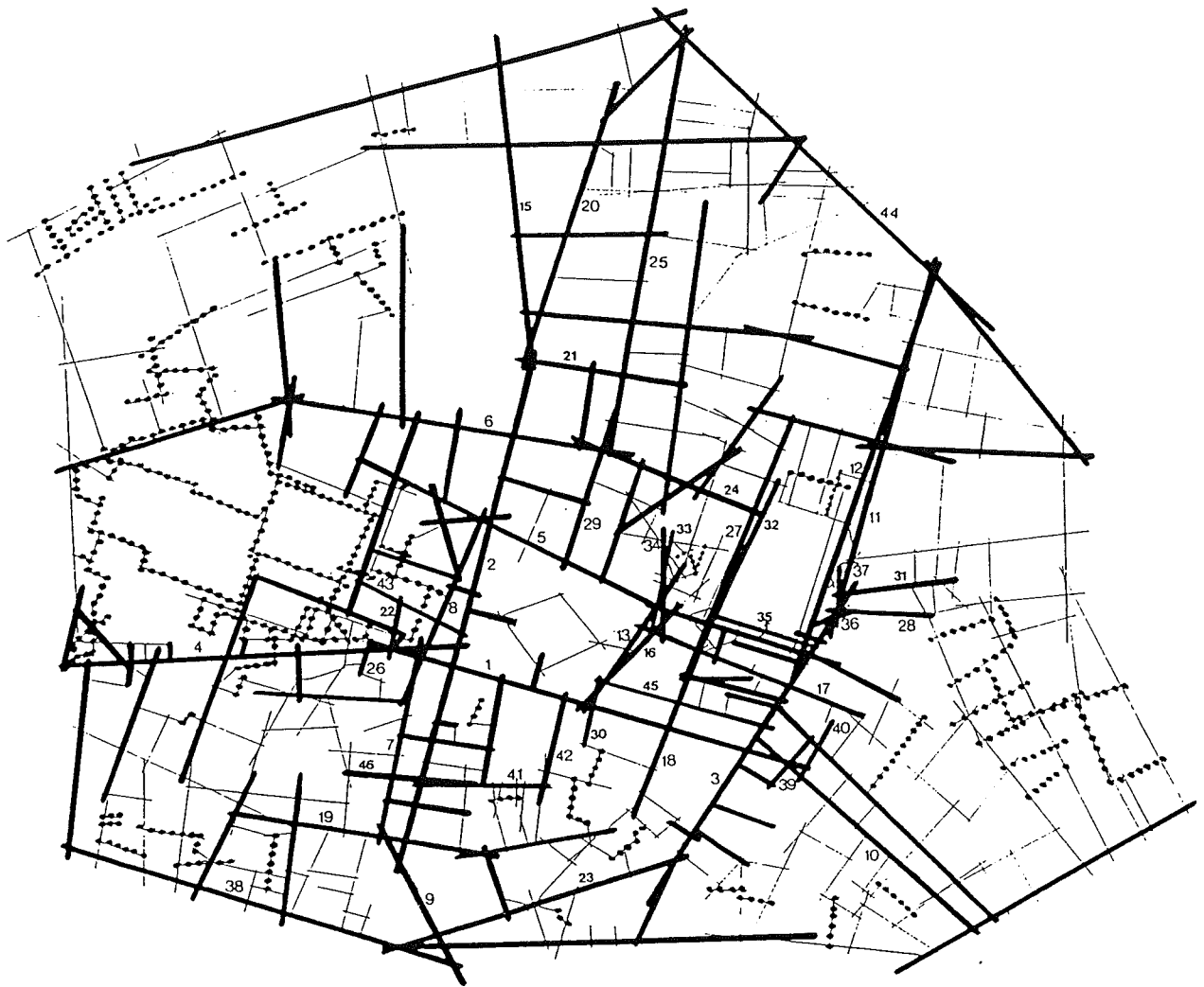


Figure 8k

Axial map of the Broadgate development, in its contextual area, as it will appear when fully complete - without the ice rink and free access across Broadgate Square. The 25% most integrated lines are shown in bold, with the first 10% numbered in the order of integration. The 25% most segregated lines are shown dotted.

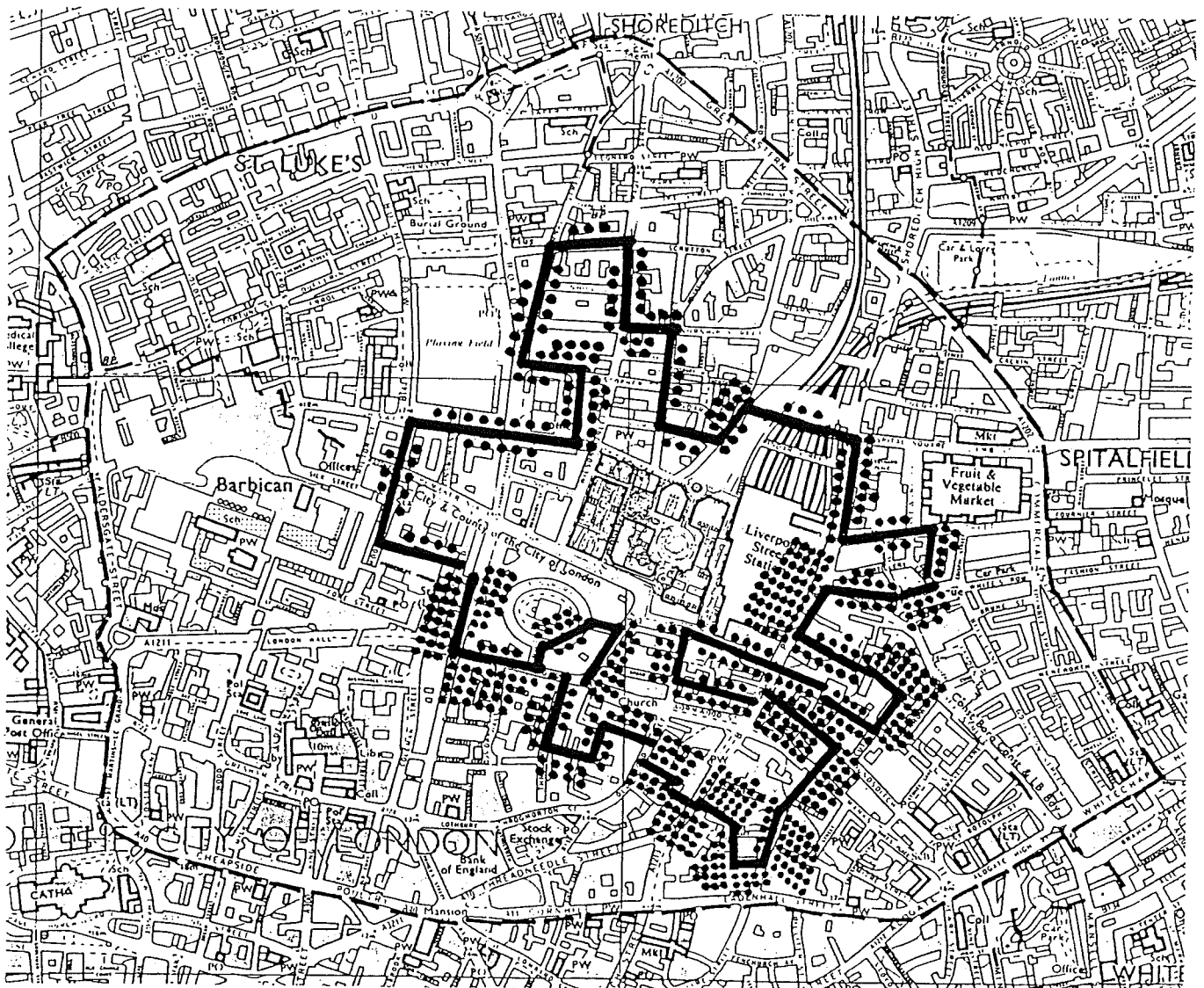


Figure 9

Pedestrian movement in the area around Broadgate. The heavy black lines show the observation route, and the number of dots the number of moving adults per hundred metres averaged over 30 rounds spread the working day (8am - 6pm).

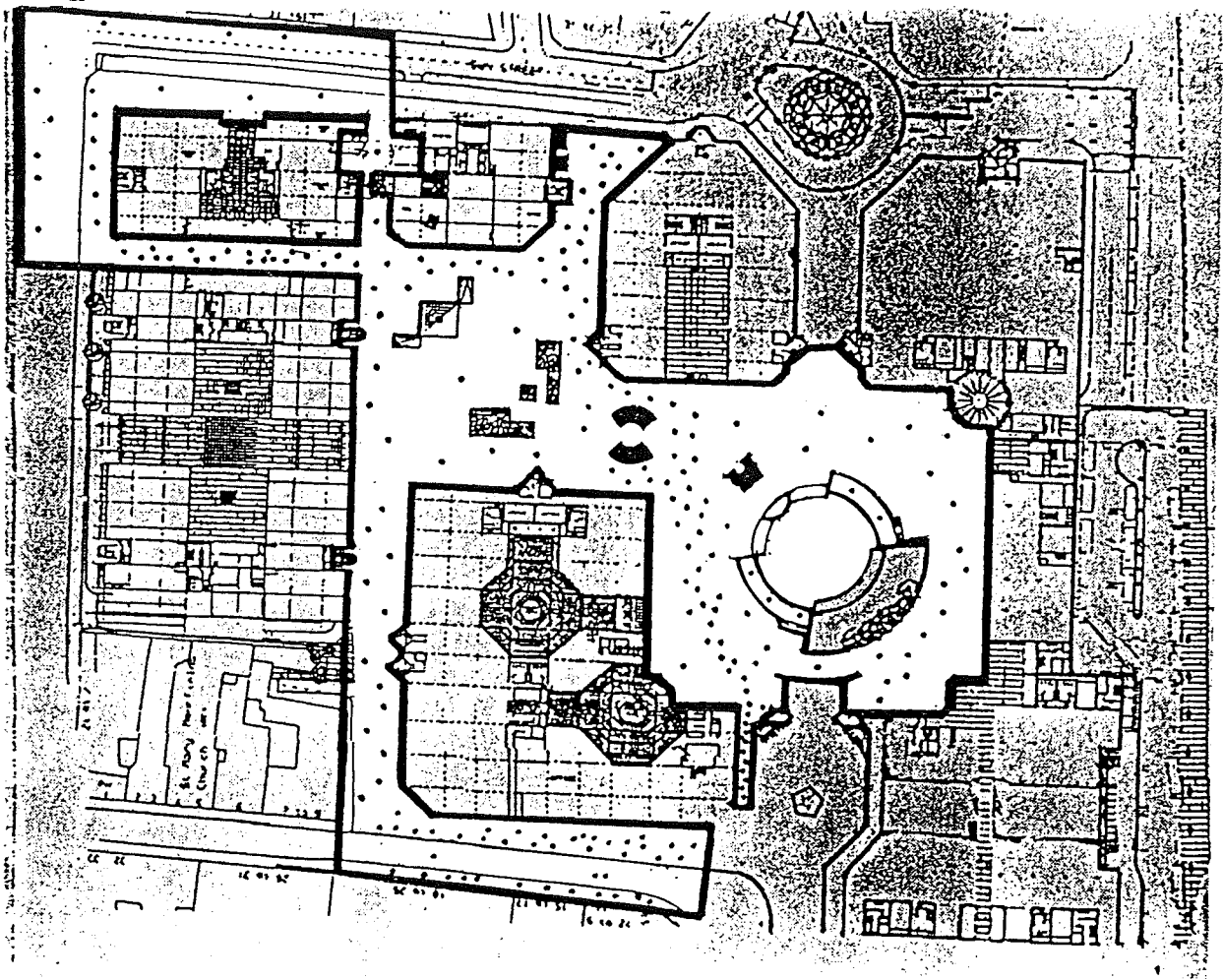


Figure 17a

Pedestrian movement within Broadgate. The diagram shows the average one minute picture of where moving people are found during the early spring period (February to March 1989) with the ice rink in operation. Each dot represents one person. The observations are based on the lunch time period 12 - 3pm.

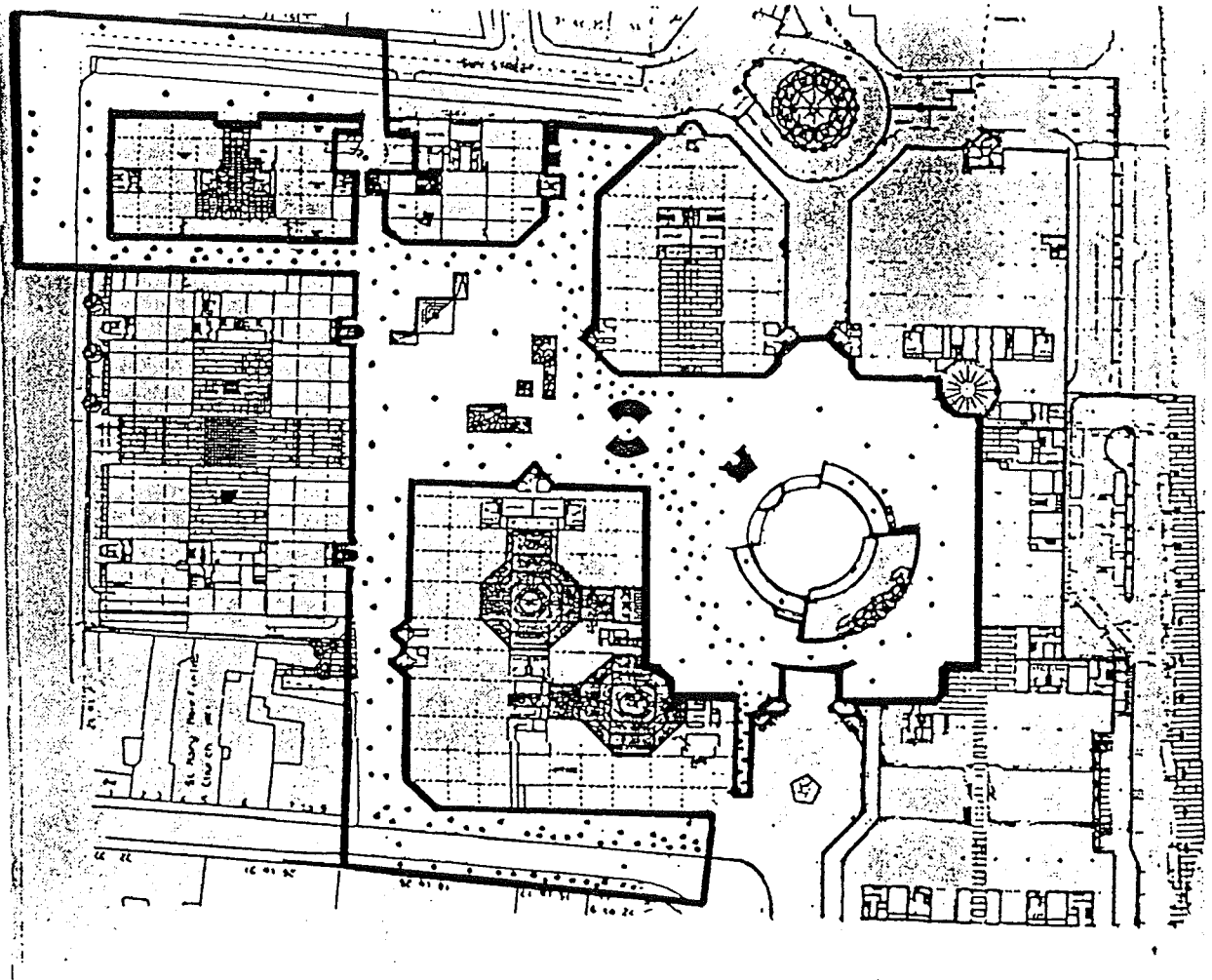


Figure 17b

Pedestrian movement within Broadgate. The diagram shows the average one minute picture of where moving people are found during the late spring period (April to May 1989) after the ice rink had been dismantled. Each dot represents one person. The observations are based on the lunch time period 12 - 3pm.

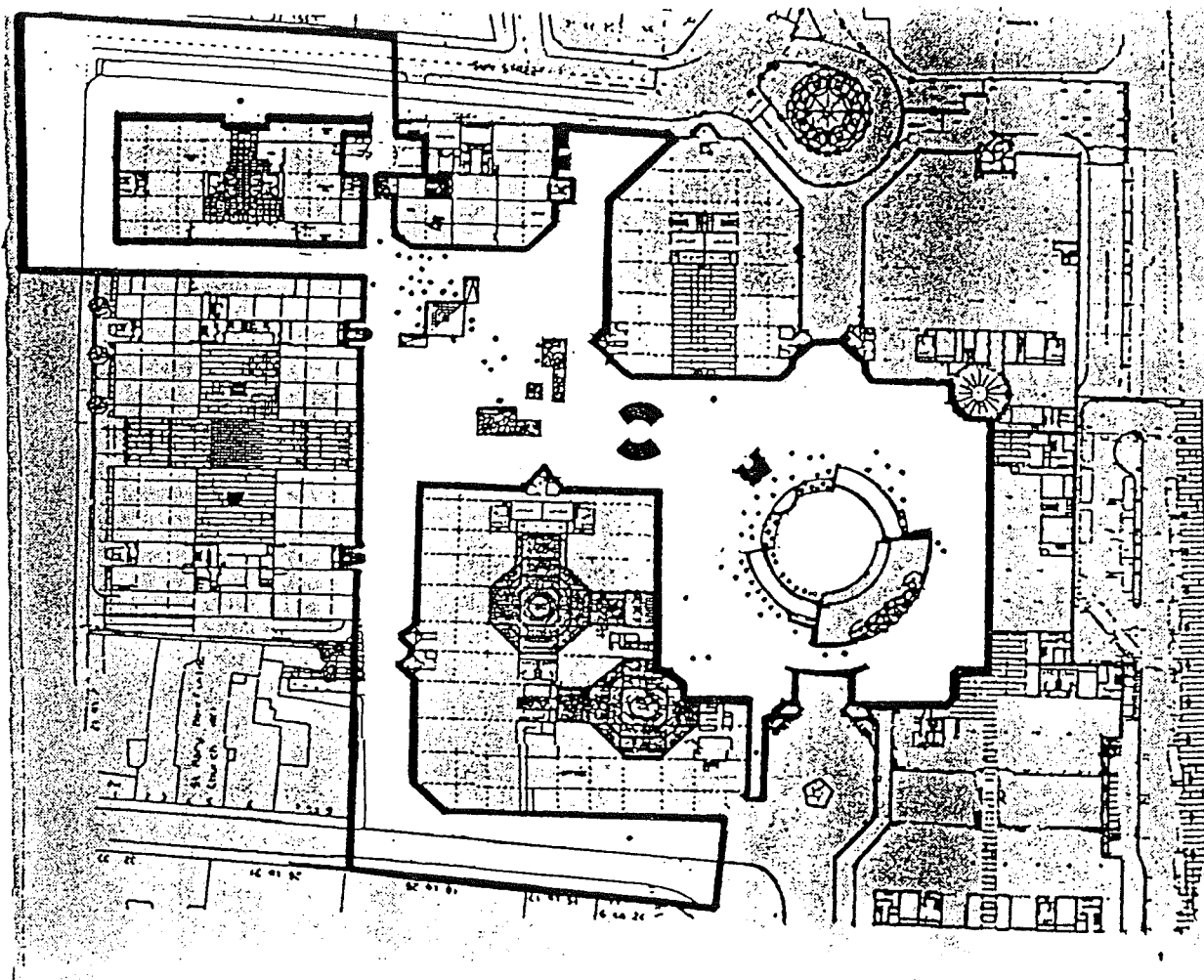


Figure 17c

Location of stationary people within Broadgate. The diagram shows the average one minute picture of where stationary people are found during the early spring period (February to March 1989) with the ice rink in operation. Each dot represents one person. The observations are based on the lunch time period 12 - 3pm.

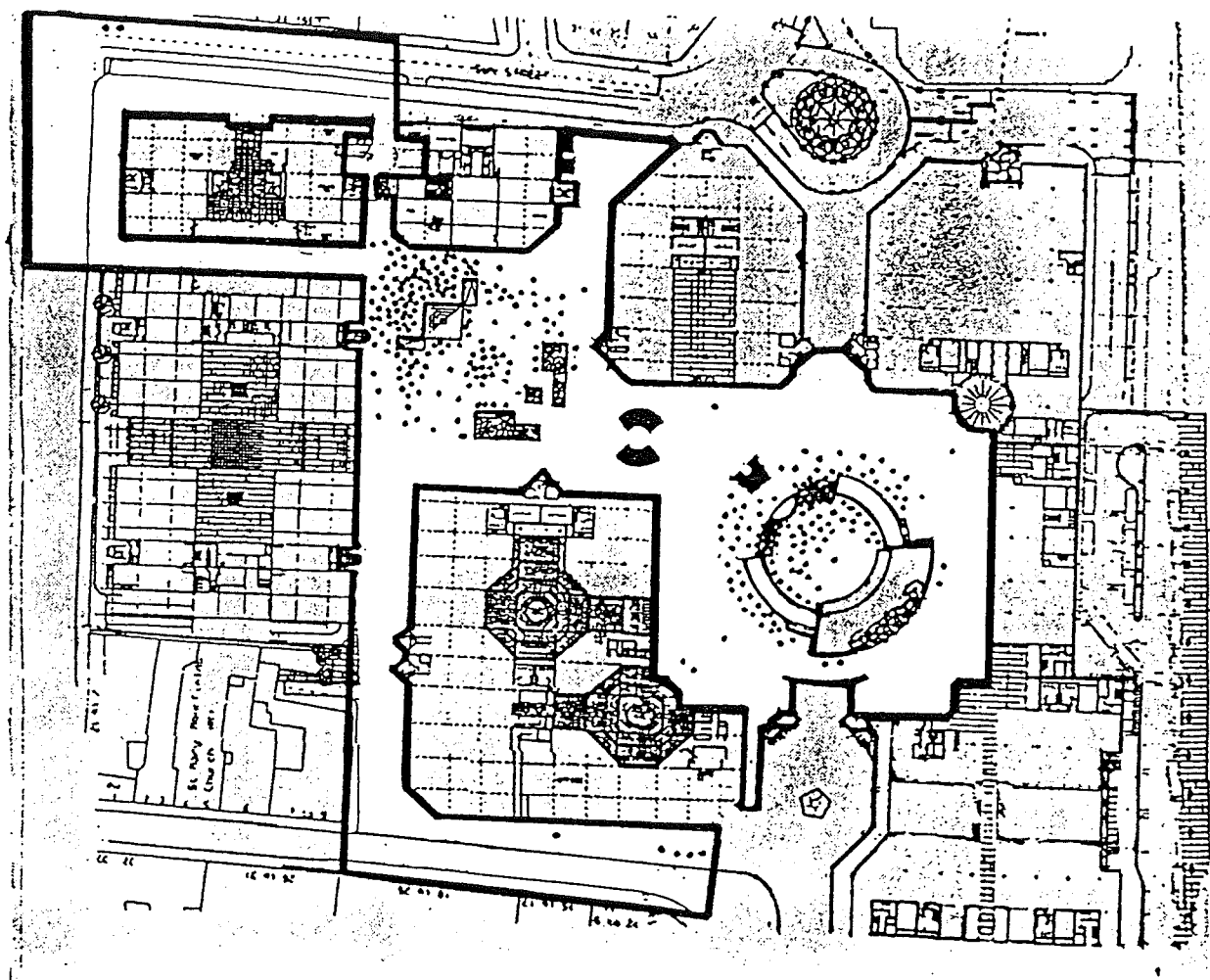


Figure 17d

Location of stationary people within Broadgate. The diagram shows the average one minute picture of where stationary people are found during the late spring period (April to May 1989) after the ice rink had been dismantled, with concerts and other events taking place in the arena. Each dot represents one person. The observations are based on the lunch time period 12 - 3pm.

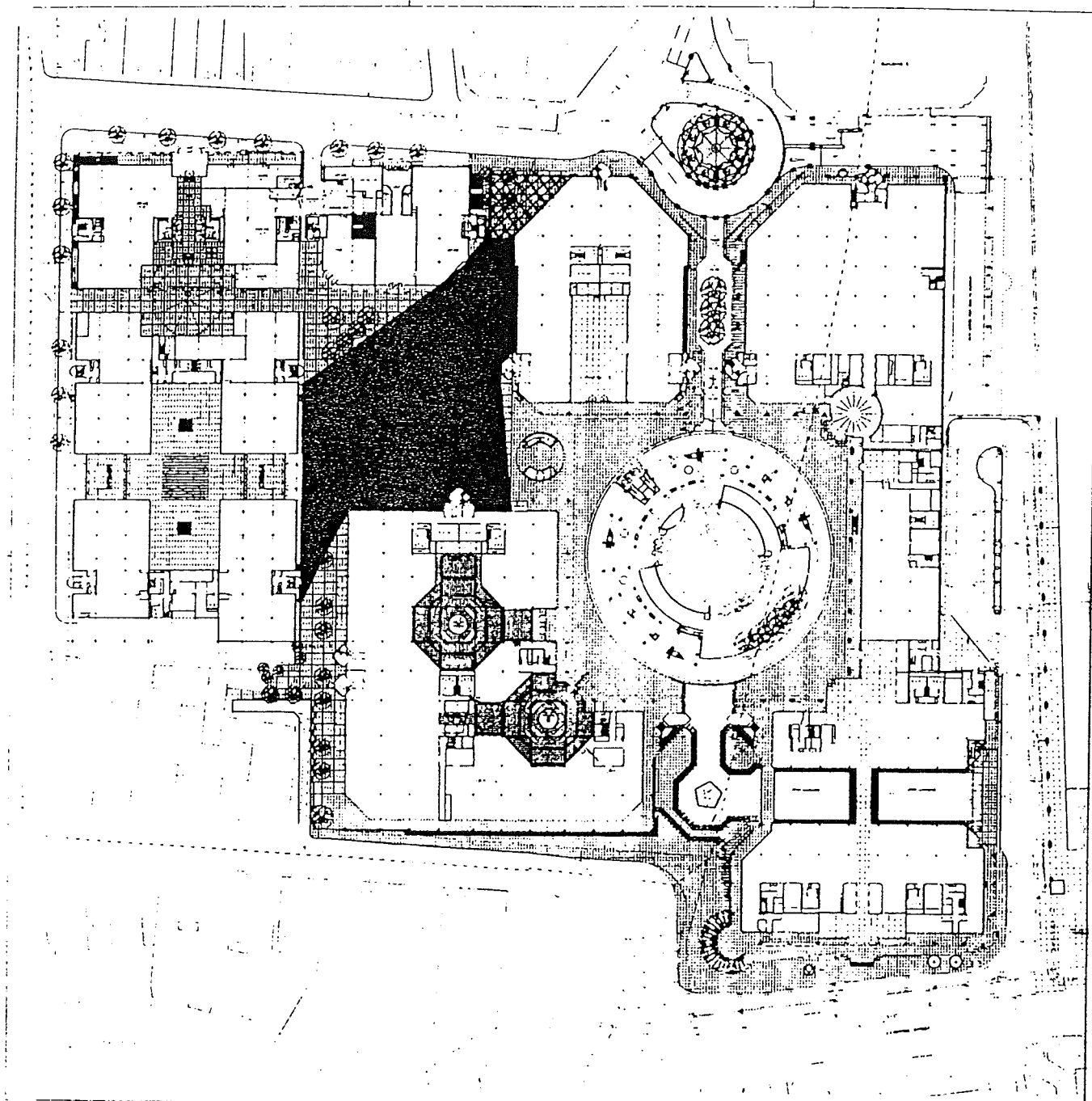


Figure 19a

The isovist from the north east corner of Finsbury Avenue Square. The isovist (shown in black) represents all of the area which can be seen, and accessed directly from this location.

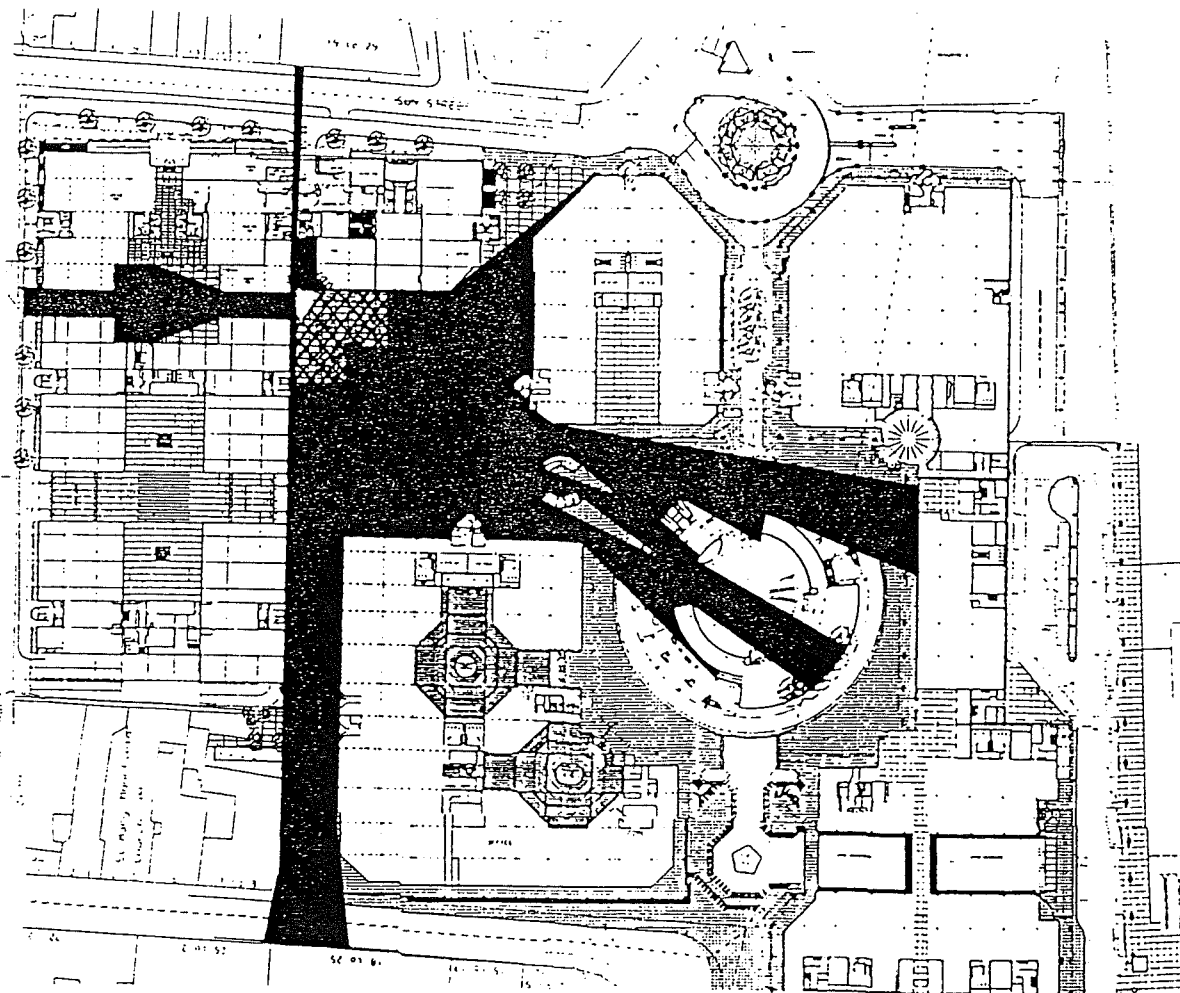


Figure 19b

The isovist from the north west corner of Finsbury Avenue Square. The isovist (shown in black) represents all of the area which can be seen, and accessed directly from this location.

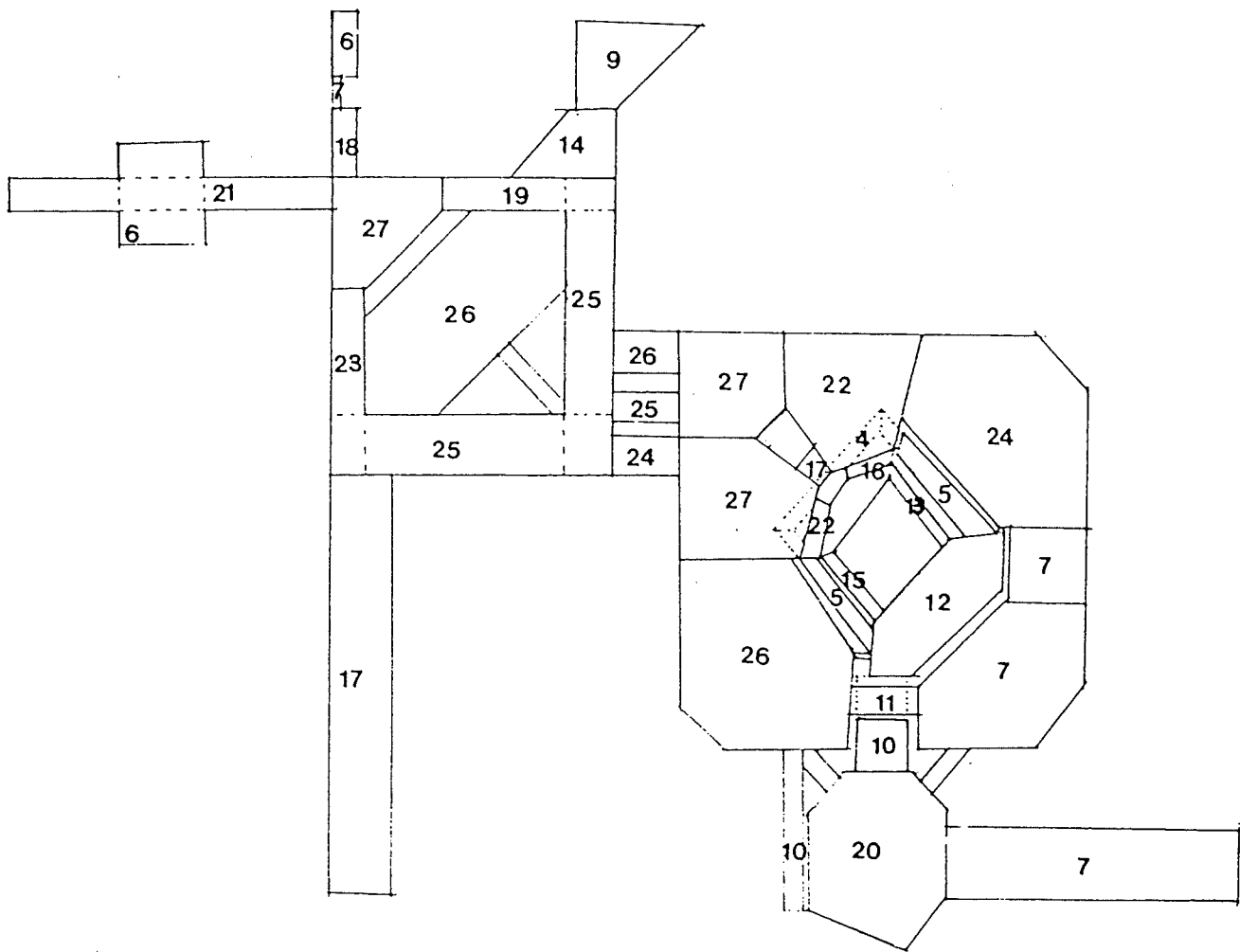


Figure 20a

Convex map of Broadgate with the ice rink in operation. The number inscribed within each space represents the number of other convex spaces which are directly visible from that location.

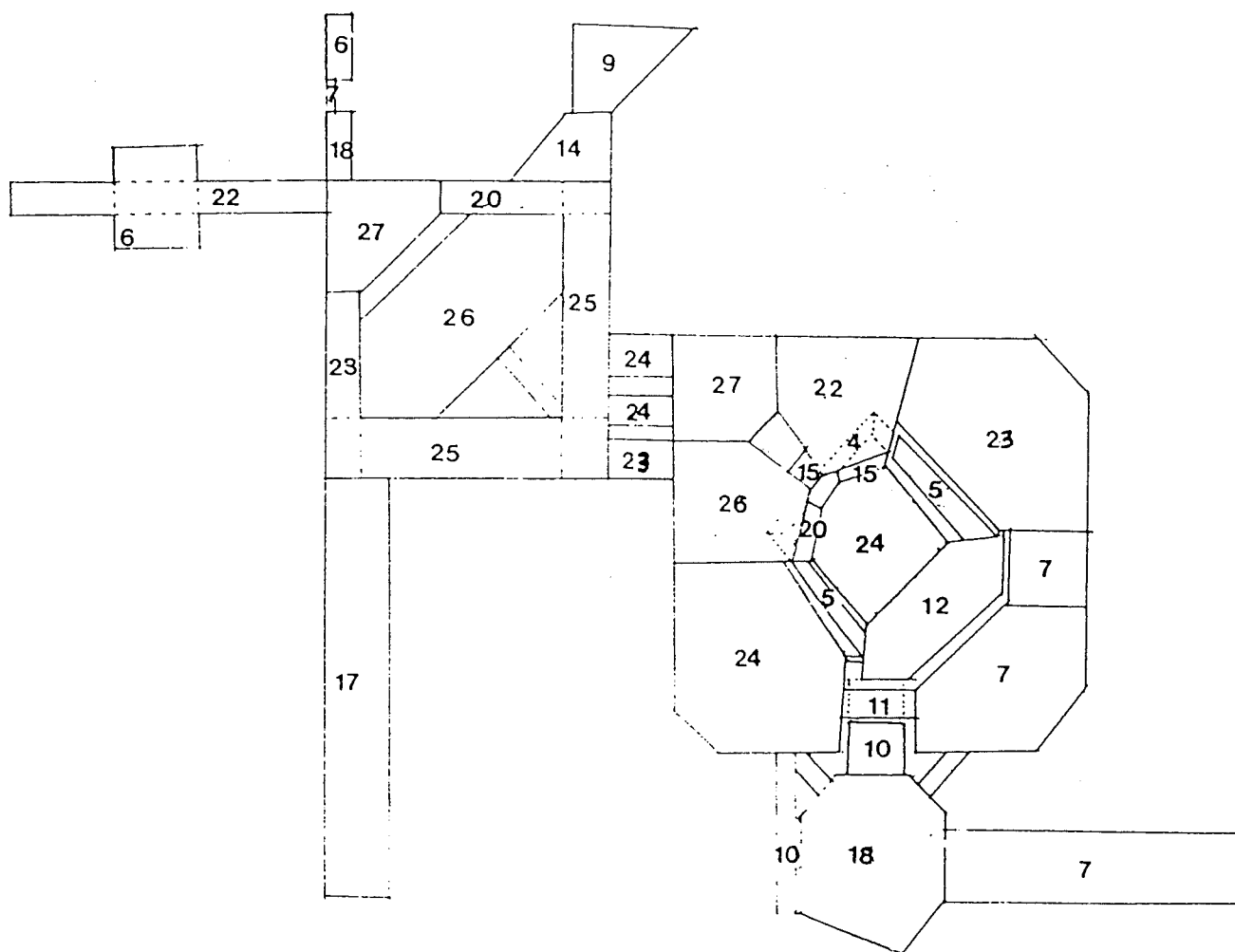


Figure 20b

Convex map of Broadgate without the ice rink. The number inscribed within each space represents the number of other convex spaces which are directly visible from that location.

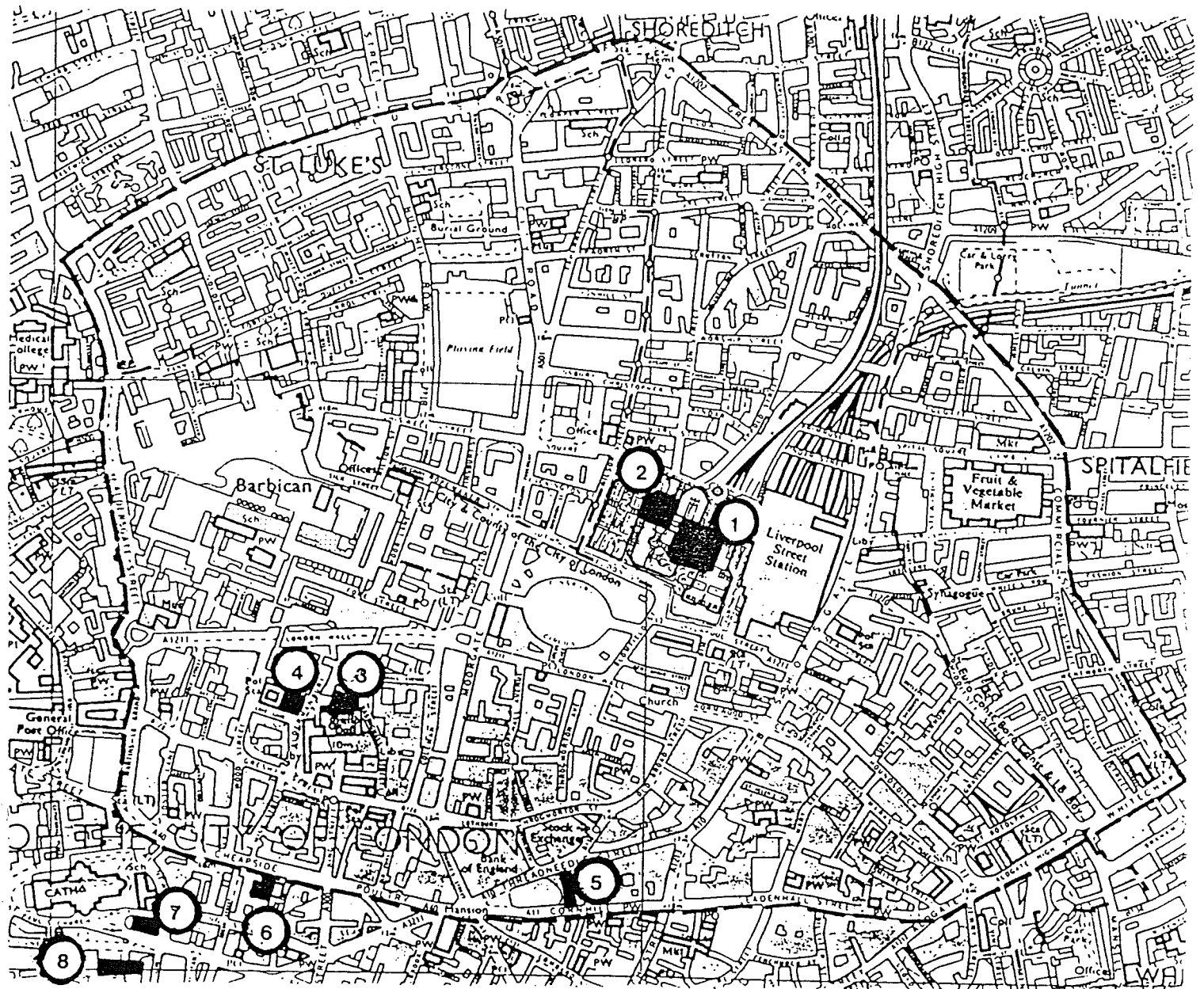


Figure 22

General map of the City of London showing the location of the two Broadgate squares and the six other spaces chosen for comparative observation.

Key:

- 1 Broadgate Square
- 2 Finsbury Avenue Square
- 3 North Guildhall Court
- 4 Love Lane Corner

- 5 Royal Exchange Buildings
- 6 Bow Churchyard
- 7 St Pauls Churchyard
- 8 Old Change Court