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MSc. BUILT ENVIRONMENT: ADVANCED ARCHITECTURAL STUDIES
BUILT ENVIRONMENT REPORT

OXFORD: PEOPLE AND TOWNSCAPE

This report is submitted in partial fulfillment of the requirements of the degree of
Master of Science in Built Environment from the University of London.

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Movement

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ABSTRACT

The purpose of this thesis is to shed light on the role of the urban configuration in bringing Residents and Visitors into 'common space' and interface. The study focuses on the city centre of Oxford, in South East England, which is a thriving hub of students, tourists and local inhabitants. Through a historic review of Oxford, the report provides a context for understanding the spatial aspects of the socio-economic processes prevalent through centuries illustrating the emergent spatial pattern contributing to the city's socio-spatial organisation that we witness today. Space Syntax theories and methodology coupled with on-site observations are implemented to evaluate the performance and social implication embedded in the urban spaces.

The thesis discusses the urban configuration in the light of Hillier's notion of 'Centrality as a process' analysing the significance of the city's growth in preserving life of Heritage and in playing an active role in the city's urban life. The spatio-functional analysis of the urban framework supported by empirical data provides insights into the movement patterns of the Resident group. The thesis also focuses in particular on the observation and analysis of the movement pattern of the Tourist in conjunction with the street character and the afforded visual fields. The analysis of co-presence follows the analysis of movement patterns as the public urban spaces, from the convex spaces of transition to the convex spaces of stasis, are studied and presented with respect to their roles in the construction of interfaces.

The report concludes that the spatial pattern of the city emergent from a prevailing trade route, has systematically oriented itself to the micro-economic activity at the historic core in effect bringing the city's inhabitants into an interface. Further, the analysis of movement patterns of tourists suggests that the visual fields afforded by the layout of the street structure has a significant effect on tourist movement and behaviour whilst the spatial layout of the city centre brings them into an interface with the Resident population.

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INTRODUCTION

The thesis sets out to investigate the socio-spatial relation at the Oxford city centre by the analysis of movement patters of the diverse users followed by the social analysis of public space. Oxford, in Oxfordshire county in South East England enjoys status as that of a *University City* of a distinct kind, besides the varied other such as *Cathedral City, City of Dreaming Spires, the Market or the Industrial Town*. The historic space at the city centre is of dual character; it is a realm of historic artefacts layered into the city defining its identity, at the same time; it is the urban core for the living city of Oxford. Further, the city's centre exhibits a distinction in the layout and character of the historic and modern; as well as the civic and academic; which are unique to Oxford.

Oxford, home to royal families and scholars of the University, established itself as a market town in the 9th century. Its role as a market town continued through the centuries as it began and continued service to the University. Today, its academic role is complemented by its significance as a *Regional centre* serving as a milieu for shopping, culture and entertainment. Its historic magnificence also attracts tourists in large numbers, from within and beyond the country. Viewed in totality, the city's well-preserved historic core is a thriving hub for students, tourists, local inhabitants and inhabitants of neighbouring parts of Oxfordshire who visit the core's shopping precinct. The centre, acts as a social spine of the city making Oxford a bustling cosmopolitan city.

With Oxford centre being a regional and tourist centre, the construction of interface between the Residents and Tourists and between Residents themselves has a social relevance. The hypothesis that sets out this thesis is that the students, locals and tourists dominate different spaces of the city centre, which might be reflected in the distinction of retail and in the use of public spaces. This thesis questions the role of the emergent spatial pattern and the city centre's spatial structure in the construction of co-presence between Residents and Tourist visitors and between the Residents themselves. This construction of an *interface* follows a prerequisite of *movement* in concurrence with space, which plays host to different forms of co-presence. The form of 'tourist-host' relation draws attention in the field of Tourism Research, as does the socio-analysis of urban space within the Social Sciences. The thesis aims to associate the exploring behaviour and movement of the tourist with the visual fields afforded by Oxford's unique street structure, through the quantitative analysis of empirical data. The movement patterns of the Resident Group are studied in relation to the spatial configuration. The analysis of the aggregate movement patterns of all users gives base to the social analysis of the urban public space.

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Chapter 1 reviews literature from Social sciences and Space Syntax relevant to the construction of interface and co-presence in urban landscape.

Chapter 2 is an outset to the research, an introduction to the growth of the city, the distinction between the town and gown, and the historic transition of the city, which in effect has shaped the physical form and the role of the present city.

Chapter 3 gives an account of the Space Syntax theories and methodology used for constructing the research.

Chapter 4 illustrates the research analysis. A discussion of the 'macro study' of the city depicts the significance of the Centre as a social realm and the role of the city's growth pattern in preserving the 'life' of urban heritage. The 'micro study' reviews the urban setting and the investigation on the consequent movement patterns of its diverse users.

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Chapter 1
LITERATURE REVIEW

1.1 URBAN LANDSCAPE AND SOCIAL CONSTRUCTION

The impact of the *Urban landscape* on the construction of social relations draws attention in the fields of ethnography, sociology, cultural anthropology as well as phenomenology (Low and Lawrence-Zuniga 2003, Baldassare 1978). In an anthropological study of Space, Setha Low (2000, cited in Low and Lawrence-Zuniga 2003, p.20) distinguishes between the physical and symbolic aspects of urban space and suggests that *social production* may be defined *as* "the processes responsible for the material creation of space as they combine social, economic, ideological and technological factors. The *social construction* of space defines the experience of space through which peoples' social exchanges, memories, images and daily use of the material setting transform it and give it meaning".

Low and Lawrence-Zuniga (2003) contend that cultural groups often draw upon the human body as a template for socio-spatial relations. They bring forth the views of Mary Douglas (1971, cited in Low and Lawrence-Zuniga 2003) who symbolises the body as a medium of communication, positioning a direct relationship of spatial arrangements and social structure with body and body boundaries. They suggest that some anthropological studies also consider the body as being isomorphic with landscape, where the landscape provides an expressive and evocative framework (Low and Lawrence-Zuniga 2003). Hirsch (1995, cited in Low and Lawrence-Zuniga 2003, p.16) attributes two meanings to 'landscape' used in anthropological studies, one where "landscape acts as a framing device used objectively to bring people into view, the other, to refer to the meaning people impute to their surroundings. The concept of 'landscape' is productive in accounting for the social construction of place by imbuing the physical environment with social meaning". Munn (1996, cited in Setha Low and Lawrence-Zuniga 2003, p.6) articulates a starting point to the theory for 'place making' in the collective movement patterns of actors in space, concurrent with the landscape, people's minds, customs and bodily practices. Movement as a prerequisite to the *social production* as well as *social construction* of space holds significance in various fields of research, including Space Syntax.

Hillier and Hanson's theory of Space Syntax, emanating from the 'Social Logic of Space' (Hillier and Hanson 1984), articulates a configurational theory to the physio-spatial and socio-spatial debate, elaborating an order between space and human behaviour, where space provides the material preconditions for social relations.

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1.2 SPACE SYNTAX: A CONFIGURATIONAL THEORY

In "Creating Life: Or, Does Architecture Determine Anything?", the postulate that architectural design affects human behaviour is termed by Hillier and co-authors (1987, p.233), as 'Architectural determinism'. They contend that design acts an independent variable in a describable process of cause and effect as against socio-cultural variables which vary and which are difficult to measure.

Space Syntax research adopts a configurational approach to spatial layout to explicate its social implications, suggesting a systematic relation between social organisation of urban or building space and its spatial layout. The crux of the research is the analysis of 'space' in relation to all spaces of the system, defined thereby as 'spatial configuration' (Hillier et al 1987). Space Syntax research puts forth a relationship between space and society, inferred from the analysis of topological properties of the configured grid. Mathematical models of this topology of urban network, analysed and supported by empirical data offer deep insights into the functional patterns of settlements and cities.

Hillier (Hillier et al 1993, Hillier 2001), contends that the structure of the urban grid has independent and systematic effects on movement patterns which he refers to as *Natural movement*. The research focuses on *Natural Movement*, as a determinant to the functional patterning we see in cities and the axial map, a representation of the urban street network, captures the natural movement fostered by the urban grid. Natural movement, in Space Syntax research, is imperative to rendering a space 'sociopetal', in conjunction with other physical determinants.

In conjunction with other theorists, Hillier (Hillier 2001b) affirms that space plays a constructive role in shaping forms of social action. Hillier contends that spatial configuration arises out of social pattern and organisation (Hillier 1996b) and that different spatial configurations create varied patterns of co-presence amongst people through their effect on movement. In this light, residential layouts conform to localised and restrictive spatial configurations, structuring and restraining co-presence while microeconomic activities tend to integrate space, both locally and globally, maximising co-presence. "It is the demands that different *kinds* of activity make on co-presence, which articulate the spatial laws to make one kind of space rather than another, in the spatial construction of settlements" (Hillier 2001b, p.13.2). The interpretation of the physical environment, in being both a reflector and conveyor of social structure and interactions is of particular interest to phenomenologists (Seamon 2003). Seamon (1994, p.37) interprets spatial pattern as an integral part of 'the particular human worlds and places' that unravels in space.

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1.3 PUBLIC SPACES: A REVIEW OF CO-PRESENCE

Gehl (1987), in his compilation 'Life Between Buildings', attributes life in urban public space to the spectrum of activities it encompasses, which combine to make communal spaces in cities meaningful. He puts forth a view that an opportunity of encounter enables to see and hear others in addition to experiencing other people engaged in various activities. These forms of passive contact at a modest level provide opportunities for maintaining established contacts or form prerequisites for other more complex interactions. In public spaces, the individual participates in a modest way and these modest forms of participation; he contends are stimulating as they are always enriched with experience (Gehl 1987).

In 'Creating Life: Or, Does Architecture Determine Anything?', Hillier and co-authors (1987, p.248), propose that in cities, the spatial morphology, creates a pattern of space use or "spatial life" within its configuration. With its effect on movement, the spatial layout is a mechanism that engenders fields of probabilistic encounter and co-presence. "This field of encounter has structural properties that vary with the syntactical properties of the layout from being sparse or dense, localised or globalised, predictable from the intelligible structure of space or unpredictable, and mix inhabitants and strangers in different degrees"(Hillier et al 1987, p.248). The authors explicate the pattern of co-presence with its describable pattern as the *virtual community*; "Community, because it collectively forms group awareness; and virtual because it has not yet been realised through interaction among its members. The virtual community is the product of spatial design" (Hillier et al 1987, p.248).

Thus, in urban or building entities, in private or public space, the underlying spatial structure complements accommodated activities whether shopping or museum browsing in advancing a social interface between users through the construction of a *virtual community*. Design forces spatial proximity, and this inevitably leads to social interaction, community spirit or an enriched experience.

The literature put forth in this chapter gives a theoretical base to this thesis and the methodologies implemented for the analysis of urban space are discussed in the following Chapter 3. The methodology in Chapter 3 and the urban analysis in Chapter 4 are presented with further theories that complement the study.

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Chapter 2

RESEARCH METHODOLOGY

2.1 SPACE SYNTAX: OBSERVATION AND RESEARCH METHODOLOGY

In alliance with Space Syntax theories put forth in the Literature Review, this chapter further illustrates the methodology adopted by Space Syntax research for systematic analysis of urban space in relation to movement and co-presence.

Space Syntax Research adopts a configurational approach to articulate the social organisation of urban space. With the Oxford centre being accessed by the *Resident* (local and student) as well as the *Visitor* (shopper and tourist), the spatial structure of the city existing today has been analysed and presented here in this thesis with respect to its role in constructing an interface between these inhabitants and visitors as well as between the inhabitants themselves. The chapter commences with an introduction to the Historic Review that gives base to the further movement study conducted at the Oxford centre. Further, the methodology used for the study of public spaces, from the street to the square and park is detailed alongside the syntactic analysis to explicate behavioural patterns and the constructed interface.

A. Historic Review and Land Survey

Hillier (2001a) contends that a dual influence of micro-economic and socio-cultural activity in society affects the aggregation of built forms over time giving rise to the emergent street pattern. The history and growth of the city of Oxford in accord with its prevailing socio-economic activity was reviewed to comprehend the significance of the constructed 'spatial topology' in building the social entity of the existing city. Complementing the historic review, a land survey included the study of the block structure detailing physical permeability as well as visual permeability. Holding particular relevance to this thesis, was the study of the street character and the afforded visual fields. The categorisation of historic buildings, colleges of the University with their departments as well as the locations and categorisation of shopping stores followed the land survey.

B. Space Syntax: Axial and Visibility Graph Analysis[*]

Hillier et al (1993) articulate the urban grid as having independent and systematic effects on movement patterns. Space syntax tools have proved valuable for the prediction of movement and patterns of activity in urban environments. Axial analysis and Visibility Graph

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[*] See Appendix-1 for further discussion on Space Syntax Terminology.

Analysis along with one of the measures referred to as 'visual step depth' was used to examine the effect of the spatial configuration on patterns of movement.

The Axial analysis is carried out on an 'axial map', which is a representation of the street network in the form of fewest and longest lines that pass through each accessible space. The Axial map of the street network for Greater Oxford was made available for this thesis from the database at Space Syntax Ltd. and was processed and analysed using *Depthmap*[†]; a software application for Axial and Segment analysis as well as Visibility Graph and overlapping Isovist analysis (Turner 2004, Turner et al 2001, Penn and Turner 1999). Syntactic analysis of the spatial configuration was compounded with statistical analysis which included scattergrams processed by statistical software JMP[‡]. These methods were implemented to understand the performance of the system both at the local and global scale. They also help comprehend movement patterns and patterns of activity in the existing urban environment, bringing forth the nature of the city and the social significance of space.

The methods described in the above sections (A) and (B) aid in understanding the physical determinants that affect the performance of the city. These determinants were analysed alongside empirical data and the methodology adopted for on-site observations is presented further in this section.

C. Observations: Movement study

Following the field study, the area for movement study was determined after an initial base-mapping of the historic sites, University colleges and retail to understand the distribution and impact of attractors on movement of the different user groups namely locals, students and tourists. The area undertaken for movement study conforms to the historic core of the city, the area linking the core to the bus-station, railway-station and the immediate area encircling the departments of the Universities. For the observation, the selected streets included a range of integrated and segregated[§] spaces, including those affronting historic sites, main shopping streets and streets flanking the Universities and departments. Few other streets are selected which fall on the routes outlined on tourist maps. The movement data was collected by the Gate-method. The *Gate count* method is useful for recording moving people or vehicles. The pedestrian count is gathered for movement across an imaginary line on the street for a period of 5 minutes for a quiet street, or 2.5 minutes for a busy street. The movement count is then summed for an hour's movement and is usually represented graphically or statistically

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[†] Depthmap is a software application created and developed by Alasdair Turner at University College London and is made available for Registered users.

[‡] JMP is a statistical software made available for academic use.

[§] Integration (or segregation) of a space expresses the ease of accessibility of a space taking the entire system of spaces into consideration.

(Vaughan 2001). For the study, a total of 60 gates were chosen for observations. The observations were then tabulated against three user groups namely Locals, Tourists and Students.

For the observation study at the Oxford city centre, Thursday and Friday were selected, as large groups of tourists were observed to visit the city on these days in addition to individual or small groups of tourists who visit consistently throughout the week in summer. The data for this experiment was gathered over three weeks in July 2006. An observation time of 5 minutes for most streets and 2.5 minutes for the busy shopping streets was allotted. Two time-periods were determined from a pilot study; 10.30 – 2.00 and 2.00-5.00, providing sufficient time for covering 20 gates (by a single observer) during each time slot. Another set of 20 gates per time slot was then covered on the following day summing to a total of 40 gates per time slot.

The Gate-method observation was repeated, choosing the same days of the week repeated in reverse order of gates. An additional set of 20 gates was observed in the third week over two days and two time slots totaling to a set of 60 gate observations. The data collected was then averaged to obtain a single data set per time slot. Further, the data of the two time slots were compared and averaged further to obtain a single data set of movement-count. This data was then thematically mapped using GIS software Map Info[**] on the Oxford map obtained from Edina[††] Digimap Services. This empirical data obtained by quantitative survey of the urban space helps determine the movement pattern of different groups of users as an initial step to understand the role of spatial configuration in the structuring of co-presence.

D. Direction Split Method: Tourist choice routes

The Gate-method is useful in quantifying the use of public space by the different user groups. The movement pattern of the tourist group was further analysed in relation to visual fields of the historic and scenic sites, observed and documented during the field study. The term 'Isovist' represents the area of the visual field from a location within space (Turner et al 2001, p.103) and is used hereon in this thesis.

The Direction-split method was exercised at the three main crossroads of the city center. The exercise was to determine the movement of the tourist in response to the visual field or isovist made available at the junction. Groups of guided tourists were not considered here as they usually follow a pre-determined route. The data at every junction was obtained for 25 units (an individual, pair or small group is considered a single unit) per street of origin progressing onto other streets at the junction, accounting for data collection of around 100 tourist units at

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[**] Mapinfo is a GIS software used for mapping and geographic analysis.
[††] Edina based at Edinburgh University Data Library, is a JISC-funded national data-centre providing networked access to a library of data, information and research resources.

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a junction of 4 streets. This method annotates the physical space as having an effect on the exploratory behaviour and movement of the tourist as one perceives the historic space.

This method was further exercised at intersections of smaller streets with main streets such as the High Street, the shopping street of Cornmarket Street and Broad Street. A time period of 15 minutes is allotted for each street and movement is recorded in number and direction at every street junction. This method is implemented to determine whether a choice of route is affected by the visual fields of historic facades visible from the various street junctions.

The impact of the spatial structure of the city on movement of its inhabitants and the impact of the isovist properties of space on the movement of the tourist visitor set the base for further research on 'co-presence' and 'interaction' between the various 'actors' in space.

E. Field study: Retail Categorisation

Hillier (1996b) suggests that 'natural movement' has an impact on land use patterns by attracting movement-seeking uses such as retail to areas of high movement, and non-movement seeking uses such as residence to areas of low movement, and thereby conceptualizes the city as a "movement economy". In the case study of Oxford, the city centre exhibits movement by different user groups. The impact of movement and space occupancy is often reflected on the land-use leading to a hypothesis for this thesis that the students, locals and tourists dominate different spaces of the city centre, which might be reflected in the distinction of retail by user category. An experiment categorisng the retail in the historic centre was carried out in conjunction with the collection of movement data. Shops were categorised with respect to the users they would probably cater to largely, and examples of retail (by Store Names) under the various categories are detailed as follows:

Local Retail- Retails shops included were Primark, BHS store, Boutiques, Westgate shopping mall, Debenhams, Timpson, Austin Reed, Orange. In addition local boutiques, hair-dressers, recruitment centres, opticians were included in this category.

Student Retail- Booksellers and Stationers such as Rymans, Books, Waterstones were included in this category. Other Retails shops included Games shops, Music stores, Sport shops, STA Travel, Bike stores and stores selling or tailoring University garments.

Tourist Retail- Retails shops included in this category were Curio shops, Tourist Information center for Oxford, 'Oxford Story' Museum, Boutiques selling University merchandise, Centres related to travel, tourism and guided tours from and within Oxford and shops that are exclusive to Oxford such as Oxford Rare Arts and Oxford Holographics.

Common Retail -All cafes, restaurants, cinemas, fast-food and dining joints were included in this category. The shops categorised in the above category may be used by other user groups but were categorised here on the probability of consistent use by the defined groups.
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G. Static Snapshots and Movement Traces

Movement is a prerequisite for the performance of public spaces. Quantifying movement by various user categories defines the street structure used largely by all user-groups and those that are dominated by specific user groups. For the analysis of public space use, the choice of public spaces ranged from street junctions such as Bonne Square and Carfax to the street of Cornmarket Street and Broad Street. Other spaces include recreation spaces such as the Christ Church Meadow, University Museum lawn, Oxford Castleyard to spaces of historical interest such as the Radcliffe Square and St. Giles Martyrs' Memorial. The Static Snapshot method and the Movement Trace method were used for the analysis of space use in these public spaces. These methods have proven to be useful as they make the patterns of space use instantly apparent to the reader (Vaughan 2001). For the ease and accuracy of observation, a convex break-up of the public space was carried out and the observation of each convex space was recorded separately.

Static snapshot is a mental snapshot of the activity occurring in space which is recorded onto a plan conforming to the observed locations and activity of the actors in space. Static people are recorded as sitting, standing, talking or if the activity is taking place in a group. The Movement trace method is used in conjunction with the snapshot method to record the route taken by a person using the space. For the purpose of this study, colour codes are used for representing the user categories of locals (blue), tourists (red) and students (green). The Movement Trace observation method was carried out for a period of 3 minutes immediately after the snapshot of the space was recorded. The movement traces were recorded and presented with colour codes assigned to the different user categories. The recorded data of the static snapshot and movement traces taken individually for the convex spaces were presented and analysed altogether on a single plan of the public space.

The data and analysis are presented further commencing with the Historic Review and Street Character detailed out in Chapter 3 followed by the analysis of empirical data presented in Chapter 4.

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Chapter 3

BACKGROUND TO THE SUBJECT

3.1 CITY PLAN: HISTORIC[‡‡] REVIEW

> "There is no subject more fascinating than the growth of a great city from its first beginnings and within its own region, especially when it has so marked and unusual a character as Oxford".
>
> - C. M Bowra (Bowra 1954), Vice Chancellor of The University of Oxford, Foreword in The Oxford Region: A Scientific and Historical Survey.

Early History

Oxford, though known as an Anglo-Saxon town, evidence of a *settlement* in Oxford, dates back to as early as ca. 4000 BC followed by Roman occupation until 410AD. Its original appearance is believed to be that of a *Kaffir kraal*[i] and a ford[ii] across the Thames to the South. Gates at the cardinal points were joined by roads, which intersected at the Carfax[iii]. The cross formation at the Carfax [*Fig. 3.1a*] is the fundamental feature of the Oxford plan (Dale 1994, p.15).

Oxford assumed greater importance in Britain during the Saxon period (410-1066). The road running North from the ford is believed to be the stem from which the town emanated, the East and West roads developed later. The Anglo-Saxon town laid out in a grid plan, was enclosed within defensive walls of earth and timber, strengthened in stone around 911. Oxford became a *burh*, or fortified town in the 10th century, as defense against Danish incursions. Gates on main routes leading North-South and East-West pierced walls of the fortification. The presence of St. Michael's Church at the North Gate, authentically Anglo-Saxon suggests the primacy of the North-South oriented Cornmarket Street (Tyack 1998) with the name *Cornmarket* indicating it to be the centre of the original market town. Footpaths and lanes then divided the interstice area between the stockade and the crossroad. In 1071, after the Danish invasion, during the Medieval age (1066-1500), a castle was built at Oxford by the Normans with its own fortification, part of the Oxford castle existing even today [*Fig. 3.1a*].

[‡‡] Source for the History of Oxford: Dale 1994, Tyack 1998, Wojgani 2005, oxfordCity.co.uk, timetravel-britain.com.

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THE NORTH GATE AND ST. MICHAEL'S CHURCH
Source: Tyack 1998
(The Church and tower still exist)

THE CASTLE AND MOUND
Source- OAHS website
(The tower and mound still exist)
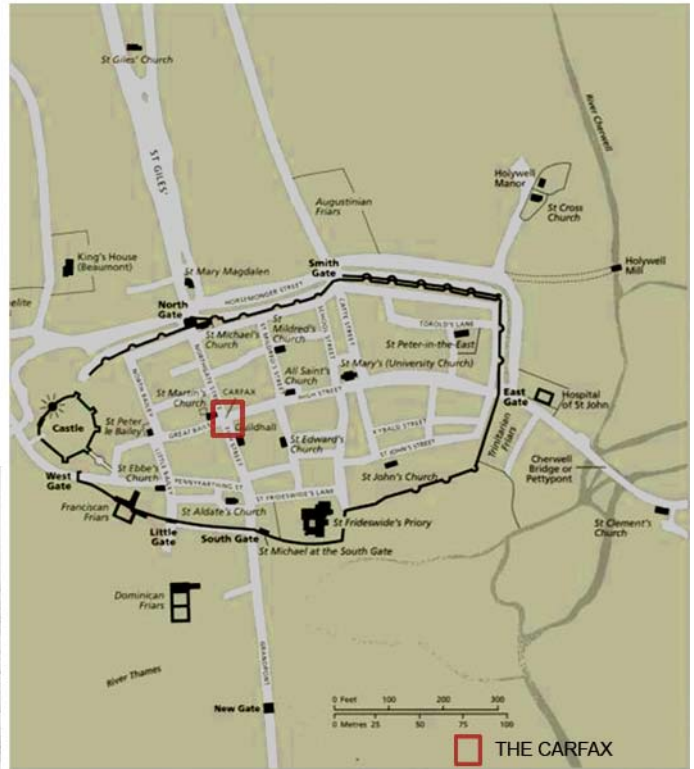
THE MEDIEVAL LAYOUT AS EXISTING IN 1250
Source: Tyack 1998
(The layout still exists)

Fig. 3.1a- The Medieval layout with elements dating back to Roman and Saxon period.

Town and Gown

Oxford is believed to have been home to scholars much before it established formal Colleges. After the outbreak of the plague in the 1300s, with the drop in population, huge expanses of land were amassed and densely developed by collegiate buildings establishing and increasing prominence within the city. During the 1500s, under Tudor rule, the city was further divided into two halves, the Town to the West and the Gown to the East. To avoid further conflict between the *Town and the Gown*§§, the Colleges adopted a form of inward looking quadrangles with their own chapel, making the Colleges introverted [*Fig. 3.1b*]. In 1542, Oxford was incorporated as a city (Wojgani 2005), with the growth of Oxford following a gradual expansion along the East-West and North-South Axes. Oxford, a market town probably since the late ninth century, continued its status as a market town in service to the University and today maintains its role as a Regional Centre for Oxfordshire.

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§§ "*Town and gown* is a historic connotation, from the Medieval ages, describing the two communities of a University town; "town" being the non-academic population and "gown" being the University students, used especially in traditional seats of learning such as Oxford and Cambridge. Differences between the Town and the Gown existed throughout Europe, but none took a violent turn as was seen in Oxford". The fleeing scholars from Oxford went on to establish Colleges at Cambridge (Source: wikipedia.com).

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MAP OF OXFORD IN 1605
Source: J Speed Map, Bodleian Library, University of Oxford:http://www.bodley.ox.ac.uk

MAP OF OXFORD IN 1800's
Source: Brown 2003, The Oxford Explorer CD Rom.

Fig. 3.1b-   The University expanse with inward looking quadrangles and dominance of the layout on the East.

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3.2 THE HISTORIC CENTRE- STREET CHARACTER

As discussed in the preceding section, the history of the city imprints features onto its layout, which exist in present Oxford. This section discusses the street character of the townscape drawn from field studies and descriptions by Thomas Sharp (1948, 1954). The city layout from the grid structure of the Medieval, expanded predominantly Northward after the 1500s with gradual extensions to the East and South [*Fig. 3.2a*]. The primary element of the Oxford plan is the Carfax, which today is the conjunction of St. Aldate's Street to the South, Cornmarket Street to the North, Queen Street to the West and the High Street to the East forming the centre of the city. Around the Carfax, the original walled city with the medieval street pattern remains intact with its University buildings drawing great attention [*Fig. 3.2b*].

Source: Sharp 1948, p.49

Fig. 3.2a- Map of Oxford in 1500 and 1750 showing Growth of the City.

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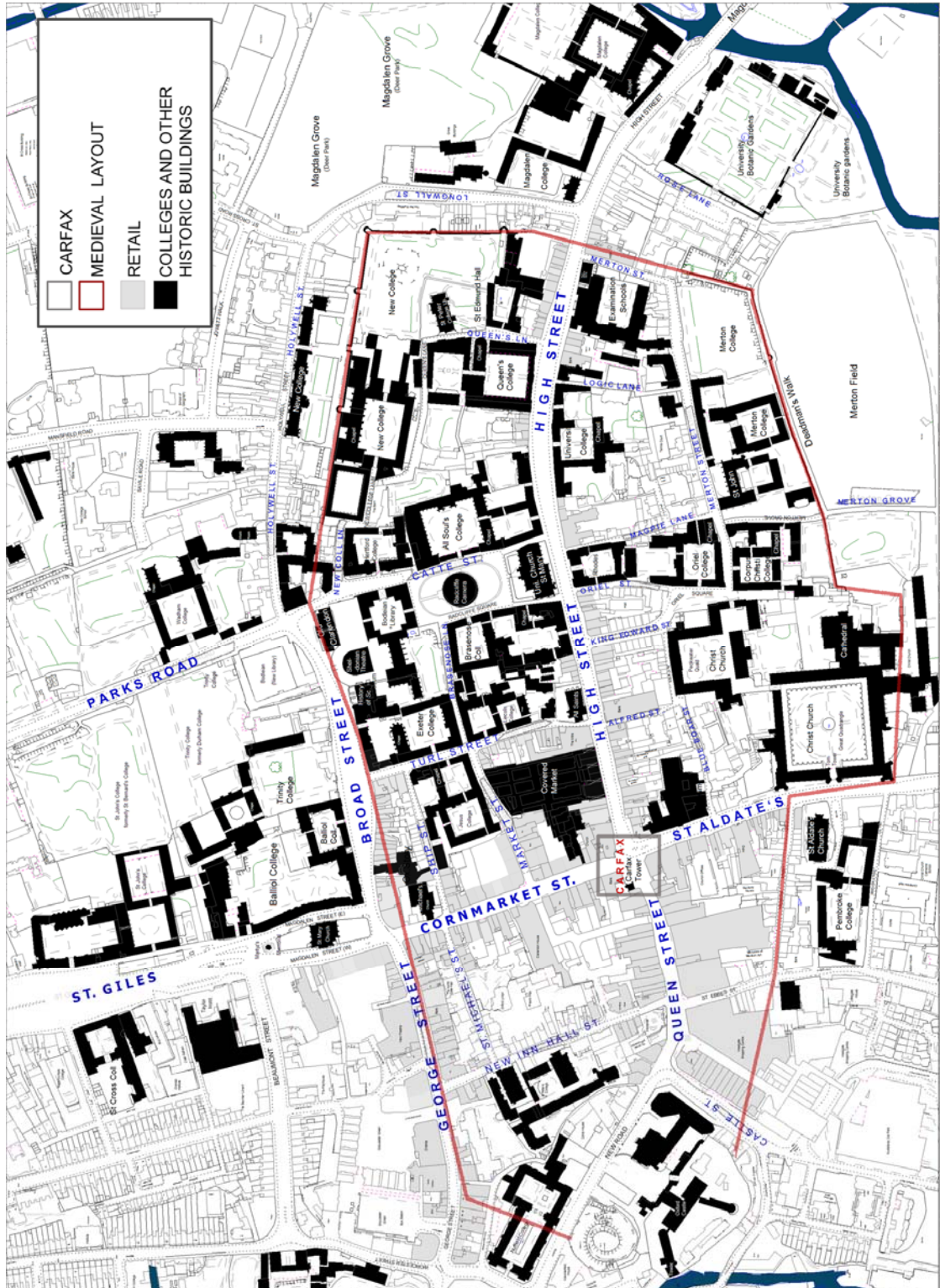
Fig. 3.2b – Street Layout.

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The architectural experience, offered here at Oxford, is diverse, ranging from the architectural buildings flanking the wider and formal streets to the domestic narrow alleys. The experience as put forth by Sharp (1948), is that of *progressing vistas* with the townscape in motion, of *framed still life* and of the added essence of domestic *foils*[iv], where the merit of each street is enhanced with the existence of the contrasting other (Sharp 1948). The street character is detailed further explicating the nature of the situated environment experienced by the moving observer [*Fig. 3.2c,d*].

High Street

The introvert Colleges with its quads, are arranged about the High Street and lend a concavity to the form of the street. In effect, the architectural splendour of the High Street is witnessed gradually in new relations to each other. As an observer moves, the buildings alter, not only in relation to one another, but also in relation to their environment (Sharp 1948, p.32).

Cornmarket Street

Cornmarket Street is said to be the core of the city's urban life with its origins dating back to Roman occupation. A pedestrianised shopping street, it runs North-South between Carfax on the South and the Magdalene Church to the North. A striking feature of the vista towards the South, is the convergence to a focal point, the Tom Tower of the Christ Church, rising above the buzz of the shopping street.

St. Aldate's Street

St. Aldate's, extends from Cornmarket Street and runs southward towards Folly bridge from the Carfax. The wide road angles gently towards the West at the Christ Church College, yielding a picturesque view of the Tom Tower from Cornmarket Street or the Carfax. This distinct feature, adopted by the piecemeal planning of the townscape is characteristic of Oxford's splendour.

Broad Street

Broad Street as the name suggests, affronts the oldest College in Oxford, The Balliol. It houses the Clarendon, Sheldonian theatre and the New Bodleian Library. The Northward extension of the city during the 14th century is visible at both ends of the Broad Street. It is partly pedestrianised at the West end of the street.

St. Gile's Street and Parks Road

St. Giles Street and Parks Road are wide roads formed during expansion of the city during the 14th century. The roads represent wide and imposing vistas characteristic of Renaissance planning. St. Giles Street forks out forming the Woodstock Road and Banbury Road to join the external ring road. Parks Road extends to meet Banbury Road and flanks the University Museum and University Park to its East.

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Narrow Streets-The spirit of Oxford extends to the informal quality of its narrow medieval lanes namely Turl Street, Magpie lane, Catte Street, Logic lane, Oriel Street and the others. These streets display intimacy of character with grace of learning among the University buildings (Sharp 1948). The narrow streets offer vistas of pursuit to the visitor, with its intricate charm, which unfolds gradually offering a contrast to the monumental grandeur of the main streets.

Turl Street

Other than providing changing vistas or framing still-life streets exhibit modification of alignment by which they provides their own focal point, inherent to the street. Such, is the vista as one walks along Turl Street from the North. The narrow-spaced buildings frame the tower and spire of All Saints Church. Only, as one draws closer, the narrow twist of an exit onto the High Street is brought into view (Sharp 1948).

Holywell Street

The kinetic quality of the townscape is visible even in the smaller streets such as in the quarter mile of Holywell Street. As one approaches Holywell Street from Longwall Road, the concavity of the street leads a visitor across a more domestic and humble townscape with views progressing onto Broad Street.

Ship Street

Ship Street is a narrow alley, linking Cornmarket to Turl Street. It displays a slump in the buzz of the Cornmarket but is edged artistically with St. Michael's Church at its junction with Cornmarket Street. The composed view from the Cornmarket Street is that of the spire of Exeter College Chapel. The Exeter layout is such that its chapel, on the interior, across the flanking buildings, lends its charm beyond and to the streetscape of Ship Street.

Brasenose Lane, New College Lane, Queen's Lane, Blue Boar Lane, Oriel Street, Magpie Lane

These streets are distinct from other domestic alleys of Oxford. They are narrow alleys lined with blank walls of universities often leading into busy streets. Their intrinsic merit, such as that of Brasenose Lane is conceived, as the dynamic view of the *Radcliffe Camera* is framed and then unfolds. The tower of St Peter's closes the view of Queen's Lane as one enters from High Street, but opens up as one draws nearer. Traversing Queen's Lane into New College Lane brings on the *Bridge of Sighs* and the *Courtyard of the Clarendon* in a much similar manner.

The diverse streetscape and their composed views discussed in this section are explored further in Chapter 4 in relation to movement patterns of the tourist group.

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Concavity of the High Street lends focal points to visual fields of the moving observer.

Chamfered building edge of University Church, Brasenose and All Souls College permits views of the Radcliffe Camer from the High street.

Marginal deviation of St. Aldates Street makes Tom tower a focal point.

The street structure of Queen's lane gives view of St. Peters Church on the East.

Street alignments at the junction of Holywell Street, St Cross Road and Longwall Street framing the domestic Oxford.

The built form of the Covered market lends a view of its facade to Cornmarket Street.

Turl Street deviates to give view of the fine detail of Lincoln College.

Exeter Chapel located strategically for a view from Ship Street.

Fig. 3.2c- Street Character

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PARKS ROAD

QUEEN STREET

ST. ALDATES STREET

BRASENOSE LANE

CORNMARKET STREET

MAGPIE LANE

BROAD STREET

LOGIC LANE

MAGDALENE STREET (W)

MERTON STREET

HOLYWELL STREET

MERTON GROVE

Fig. 3.2d- Images of Street Character.

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Chapter 4

RESEARCH   ANALYSIS

The Research Analysis illustrated further in this chapter is sub-divided into a Macro-study of the city and a Micro-study of the public domain at the city centre.

- The Macro study discusses the physical form of the city and the role of the centre as an attractor. The analysis of the growth of the city since the 14th century also highlights its significance in preserving Heritage life and bringing the city inhabitants into an interface with the academia.

- The micro study illustrates the framework of the city centre, which is the area under observation. The discussion of the street pattern, block structure, land-use, physical permeability and visual permeability at the centre are presented in relation to the movement patterns of the city inhabitants. The micro study focuses on the movement of the Visitor Tourist in response to the Isovists afforded by the streets as discussed in the preceding Chapter 3. The chapter further progresses with a review of co-presence of the Resident and Tourist group on the street network and public spaces within the city centre.

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RESEARCH ANALYSIS – MACRO STUDY

4.1 THE PHYSICAL CITY OF OXFORD

The physical city of Oxford, analysed through its axial representation [*Fig. 4.1a*] renders the structure and order in the system. The syntactic analysis of the axial map showing global integration values (ranged chromatically from higher integration in red to lower integration in blue) depicts a centre to edge pattern of integration, with a highly integrated core. The integrated orthogonal spokes link the heart of the city to the external quasi ring road and is highlighted in the Local integration map [*Fig. 4.1b*]. This pattern is defined by Hillier as the *deformed wheel* (Hillier 2005), indicating a morphological structure of the settlement acting as a whole. Phenomenologists such as Seamon (1994) consider this pattern of the *deformed wheel* as significant to the phenomenology of place and activity. The streets linking the centre to the edge are frequently used by inhabitants as well as by visitors who use these streets as the main routes to the city. The effect here being that the structure of the city creates probabilistic interfaces between the inhabitants moving in and out of the buildings and those on the street, and between those moving in the global scale of the system and those moving in the local scale areas. (Hillier 2001a, Seamon 1994, Hillier and Hanson 1984).

In Space Syntax Theory and analysis, the global measure of integration provides valuable insights into the working of a system as a whole. 'Integration' measures the mean depth of every line in the system from each of the other lines in turn relativised in accordance to their possible depth with that number of lines (Hillier et al 1993, Hillier and Hanson 1984, p.108). The axial representation showing Global Integration Rn [*Fig. 4.1c*], superimposed with residential neighbourhoods and local retail stores, indicates a structure where the residential areas or neighbourhoods weave around the orthogonal axes, with a green belt of University grounds or rural open space predominantly occupying the area between the residential neighbourhoods and the external ring road. The city through the centuries has evolved and is configured today as a *functional whole.*

Oxford today, functions as a regional centre for the County of Oxfordshire. The axial map of Oxford reveals a configuration with the *primary shops* located along the axes, in the integration core of the city's structure. Most of the *secondary shops*, or *District centres* are then nestled on the centre-to-edge routes which link the integrated core to the residential areas. These district-centres of suburban shopping serve the residential population of Greater Oxford for the supply of day-to-day requirement whereas the Central city shops [*Fig. 4.1d*] offer goods of specialised kind and in a wider range than the suburban shops.

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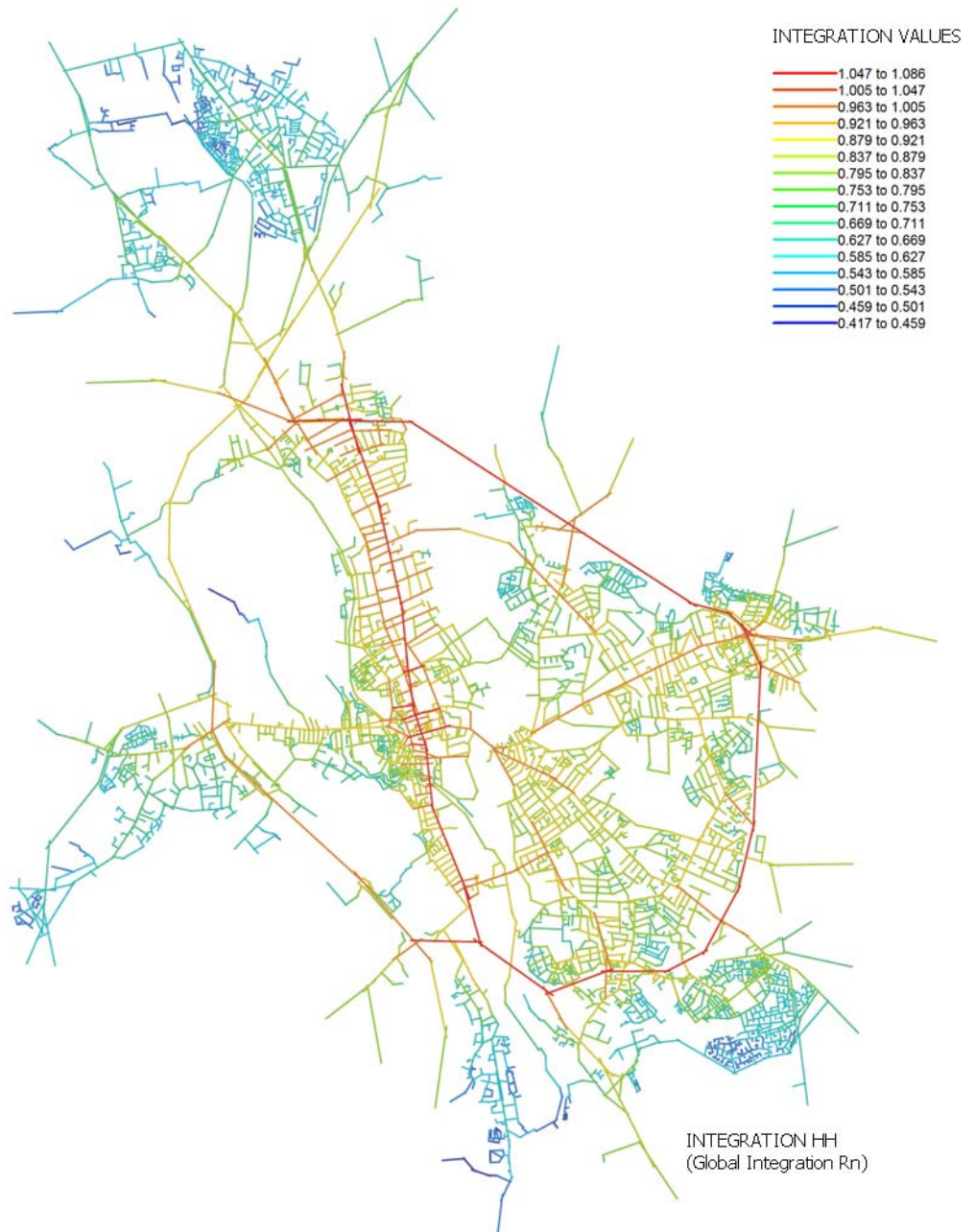
Fig. 4.1a - **Global Integration Map (Integration HH) of Oxford.**
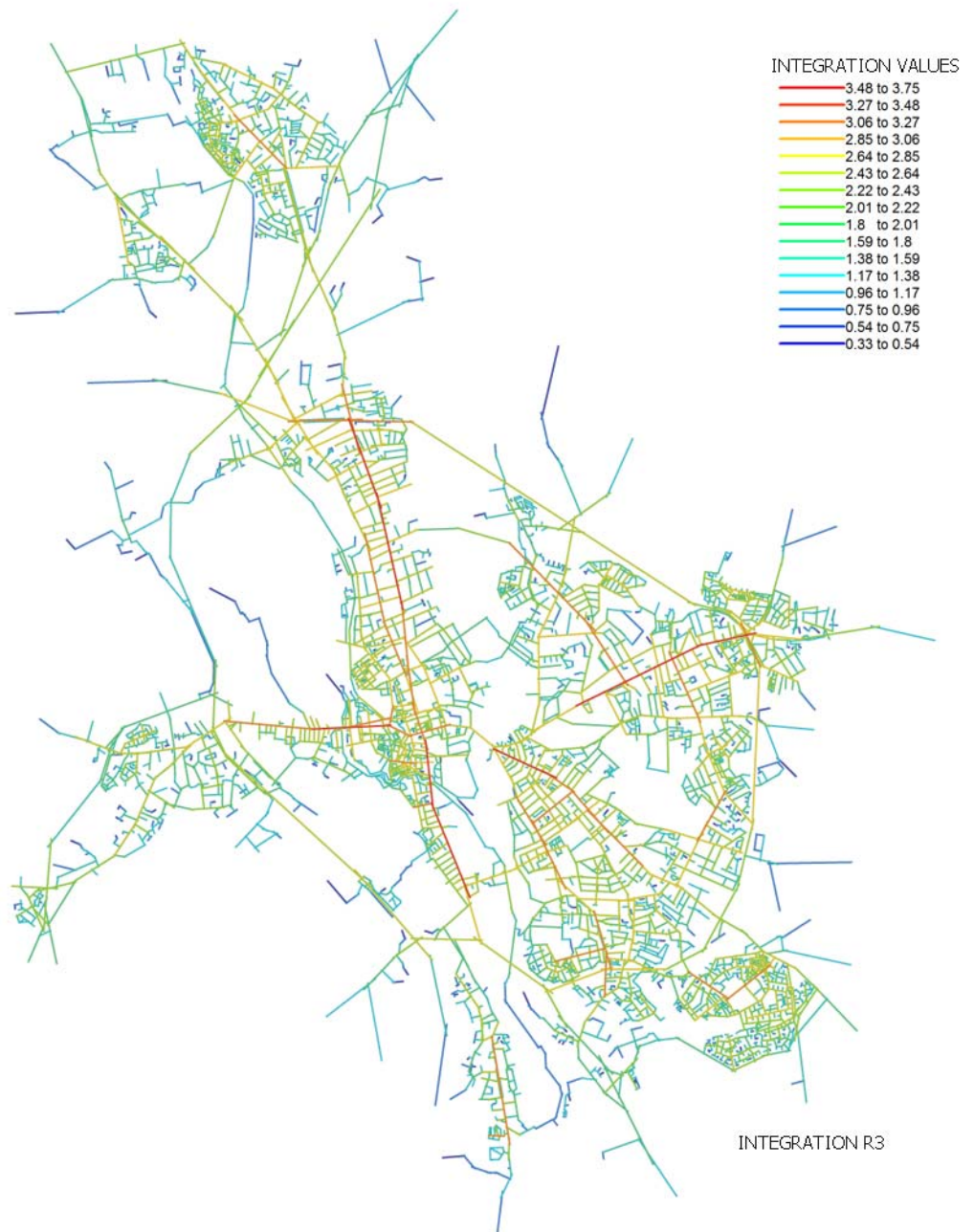
Fig. 4.1b - **Local Integration Map (Integration R3) of Oxford.**

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Source: Oxford CIty COuncil:Interactive Oxford Local Plan Proposals Map
(http://localplan.oxford.gov.uk/localplanproposalsmap/)

Fig. 4.1c – Distribution of Suburbs and District Shopping.
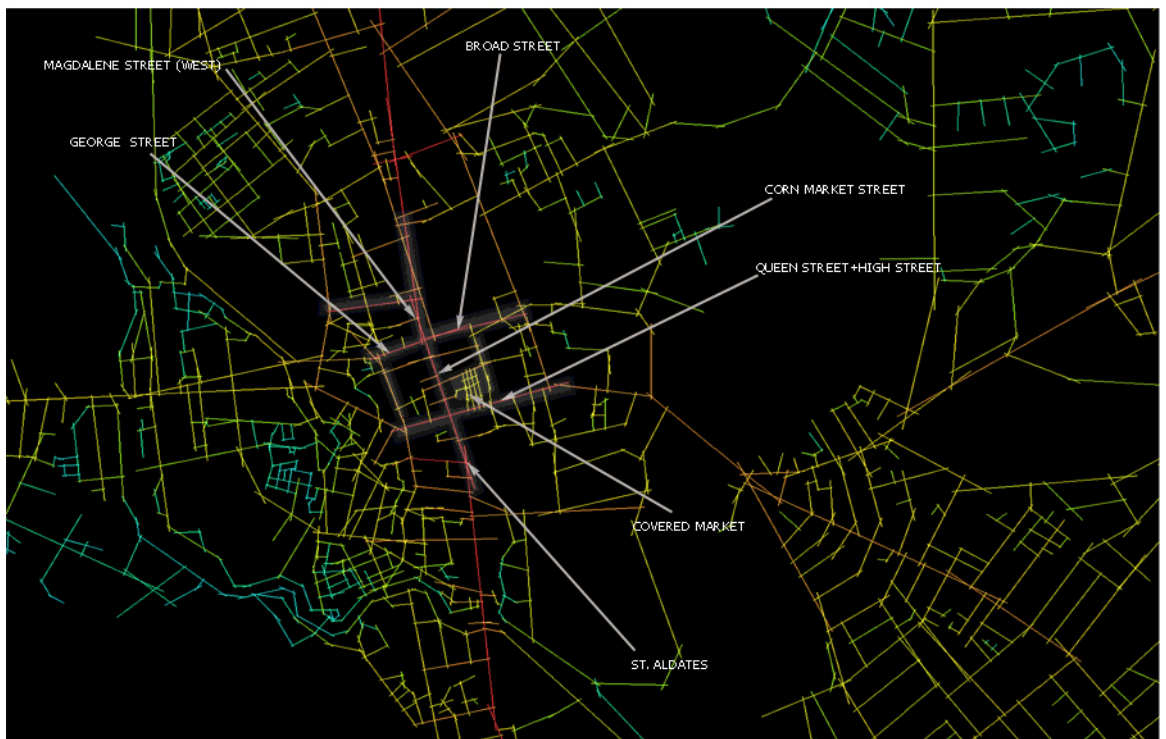
**Fig. 4.1d –   Global Integration map (Large scale) for the city centre showing Primary Shopping
          for the city.**

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4.2 AXIAL ANALYSIS: SPATIAL CONFIGURATION, HERITAGE AND URBAN LIFE

Karimi (2000), through his study on Historic English and Islamic cities proposes that conservation should be seen as a process aimed not merely at safeguarding heritage, but at preserving the 'spatial spirit', so that the old city can function together with the modern. However, his study also puts forth a major problem that arises when the city is to be preserved as a whole. The problem is with the contradiction between the city being a carrier of urban life as well as a conveyor of the city's heritage (Karimi 2000, p.222).

The historic transition of Oxford shows the growth of the city constantly nucleating the centre of micro-economic activity at the Heritage core of the Medieval layout [*Fig. 4.2a*]. The axial analysis of present day Oxford, showing global integration layered with the historic elements [*Fig. 4.2b*], shows a highly integrated core for the global structure, with spines running through the Carfax, which the market for the city existed. The city centre still harbours within it, a sphere of micro-economic activity and interactive life (as it houses Primary shopping for the city) which helps explain how the historic centre has maintained its central importance.

Like most English organic cities, documented by Karimi, Oxford follows as a successful example in maintaining its position as the focal point of urban life and heritage. Hillier (1996b) contends that the 'movement economy' brings about the part- whole structure for cities. For organic cities, the part-whole relationship shows strong correlation for the centre emphasising the spatial structure, which is shaped in response to the socio-economic activities, acting as 'generators' for the global form (Hillier and Hanson 1984, Karimi 2000). Karimi (2000) suggests that organic cities maximise the part-whole legibility in the areas, which are most likely to be visited by different people from inside and outside, but minimises the same when the legibility is undesired (Karimi 2000, p.227). The scattergram of the part-whole relationship of Oxford's spatial structure [*Fig. 4.2c*] articulates the strong historic and economic core against a significantly low relationship for the rest of the city.

The analysis of the axial representation of the city of Oxford and its growth since the 1400s (Sections 4.1 and 4.2) suggests that the growth of the city has been driven by the micro-economic activity at the city's medieval centre. Since the city centre houses the colleges of the University as well as the primary shopping for the city, the inhabitants of the city, both locals and students are brought into an interface at the historic centre.

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Fig. 4.2a- Historic Growth of the city since its existence as a Medieval town.
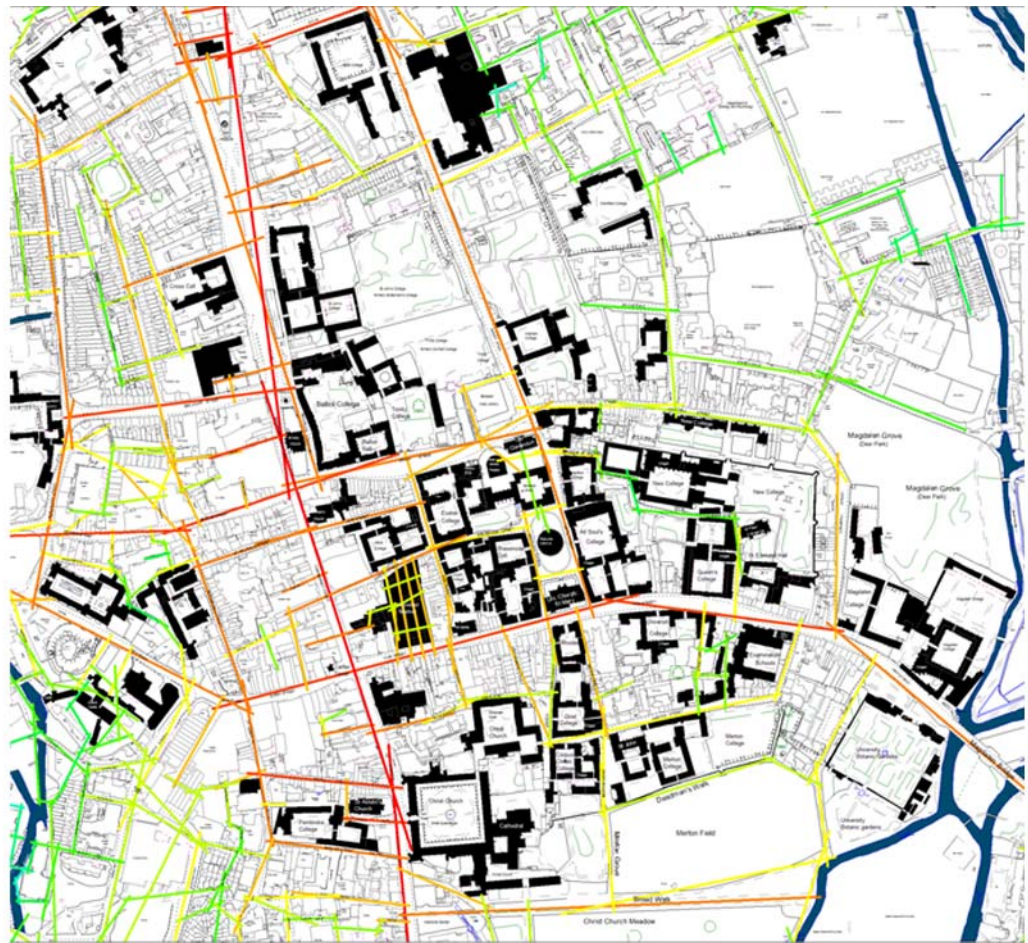
Fig. 4.2b – Integration core (Global Integration HH) through the Heritage centre.
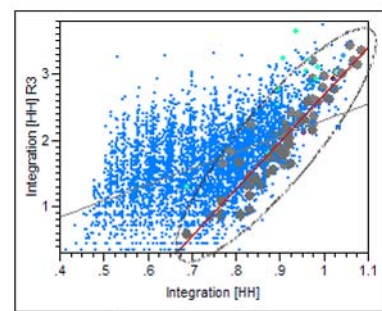
Fig. 4.2c – Local (R3)/Global (Rn) for Oxford showing the City Centre as sub area.

DATA AND SYNTACTIC ANALYSIS – MICRO STUDY

4.3 MOVEMENT PATTERNS – INTRODUCTION TO THE URBAN FRAMEWORK

The urban framework creates the potential for movement, activity, co-presence and interaction. A field study carried out at the city centre of Oxford and findings of The Space Syntax Ltd. study at West End in Oxford are presented and discussed in this section, analysing the urban framework in relation to the presence of inhabitants and visitors on the city streets.

City expansion: Intelligibility, Part whole relationship
The growth of the city since the Medieval period [*Fig. 4.2a- Previous section*] depicts the expansion of the city Northward, along the vertical axis through Cornmarket Street and Eastward, along the High Street. The extension along the vertical axis is articulated by the prevailing North-South trade route that passed through Cornmarket Street. Beyond the 1800s, the expansion along the North-South axis is contiguous while along the West, the extension is piecemeal and fragmented. The intelligibility of the system as a whole started to decline as the city expanded (Wojgani 2005). Intelligibility*** is a measure, which indicates how the local and visible properties of space form a good guide to inferring the global structure of the city (Hillier 1986). Conceived as a whole, the present spatial structure of the city is unintelligible however maintaining a part whole relationship with the centre as discussed earlier [*Fig 4.3a*].
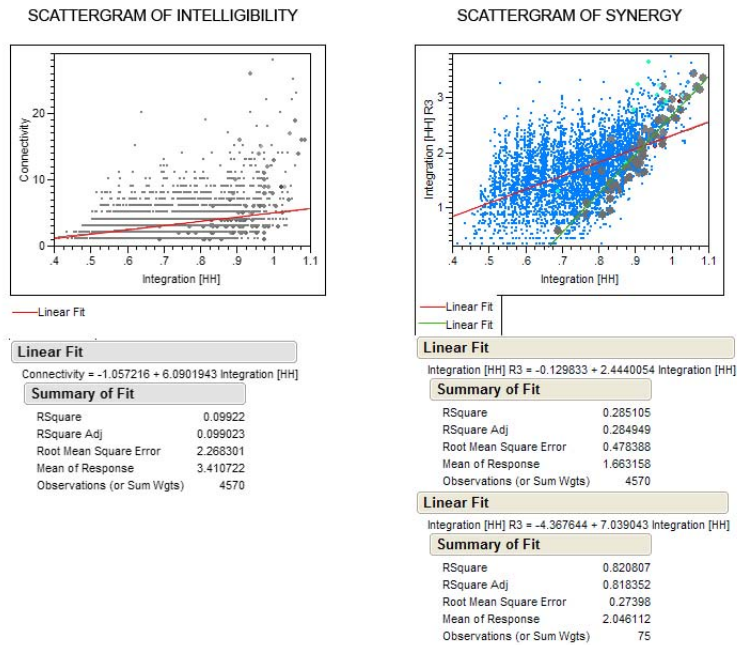
Fig. 4.3a- **Intelligibility and Synergy Measures for Greater Oxford.**

*** The concept of intelligibility and other Space Syntax Terminology is further detailed out in Appendix-1 (App 1.1).

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Street Network and Urban grain [*Fig.4.3b*].

The street structure of the city centre comprises the main thoroughfares through the Queen Street- High Street and Oxpens Road. The North-South thoroughfare reroutes through Beaumont Street as Cornmarket Street is pedestrianised alongside part of Broad Street. The Global Integration (HH) map for the whole of Oxford highlights the main thoroughfares at the centre including Cornmarket Street [*Fig. 4.3c*].

In a study of the Urban face of Oxford in West end to the South-West of the medieval layout (Space Syntax Ltd. 2006), the analysis reveals the character of coarse and staggered urban grain, with irregular block shapes restraining visual access. Space Syntax analysis on cities; discussed in the report in relation to the study on the Westgate development demonstrates the impact of large blocks on pedestrian walking time. Block size and shape affect the urban configuration restricting orientation, and the level of visual access, all of which affect movement and the level of co-presence. The preserved historic fabric shows a fine grain structure of regular sized urban blocks. These spatial conditions of smaller blocks and permeable structures aiding trip-efficiency, causes local intensification and minimizes metric integration by which the area becomes a 'configurational attractor' (Hillier 2001). The intensified grid characteristic is a feature in live centres of most towns and is referred to by Hillier as the 'Process of Centrality' (Hillier 1999). The urban fabric of regular size and shaped block sizes along the axes, large blocks towards the north and south expansion and irregular shapes of blocks on the South West at Westgate is evident in Oxford's city centre [*Fig. 4.3d*].
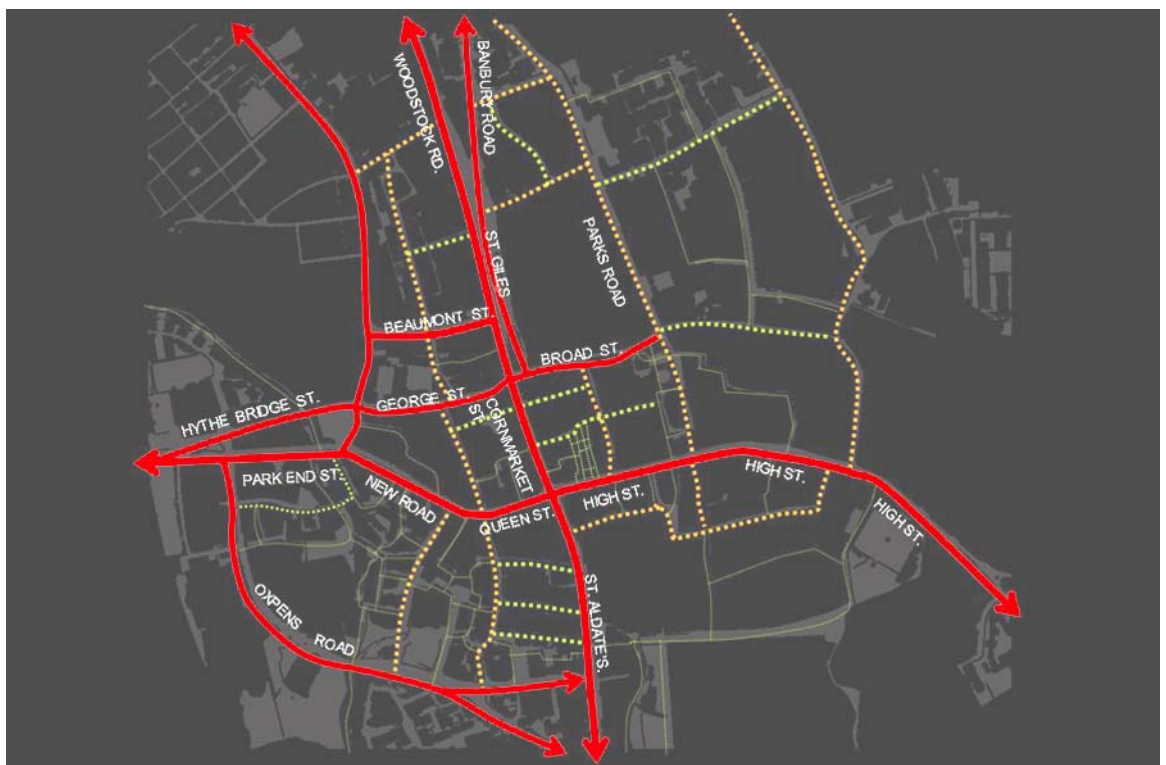
Fig. 4.3b – The street structure of the city centre.

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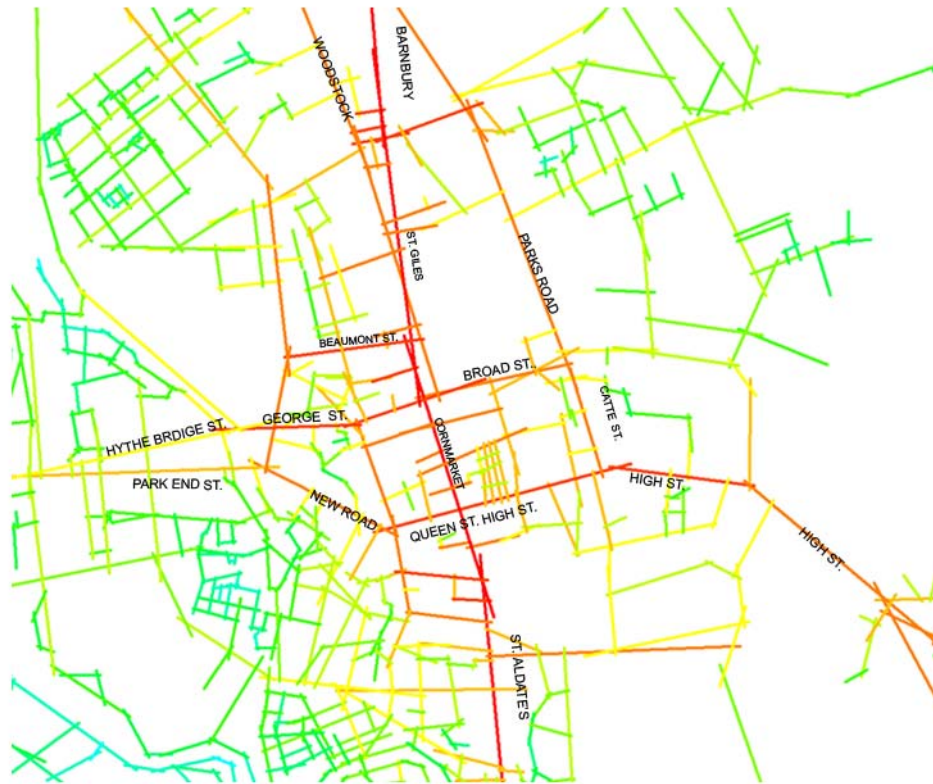
Fig. 4.3c – Global integration highlighting the main thoroughfares of the street structure.
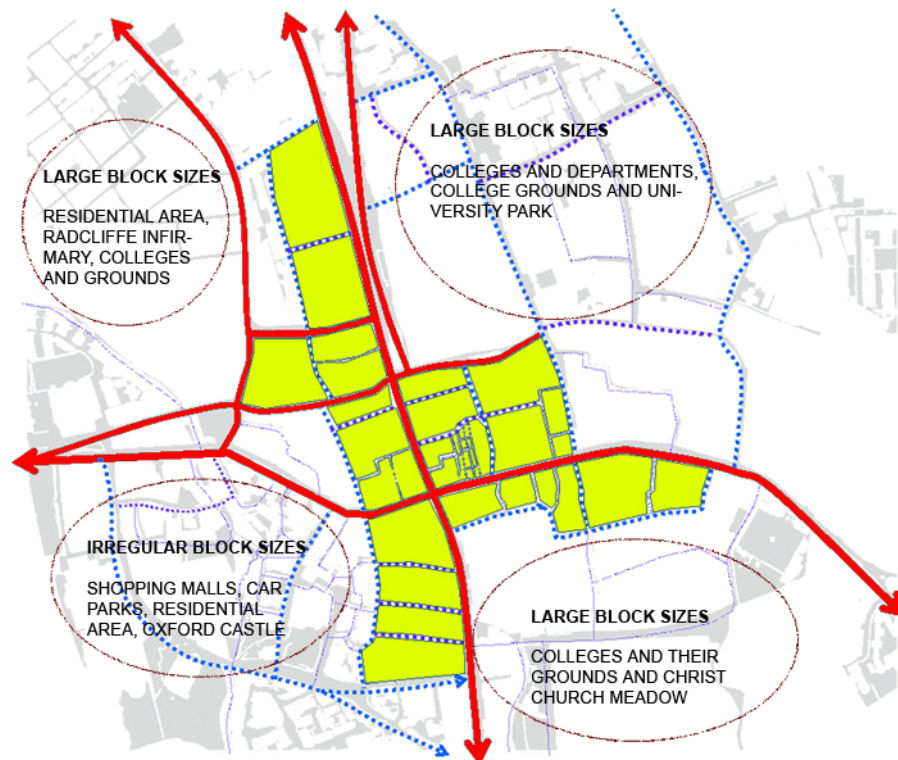
Fig. 4.3d – Block shapes and sizes of the Historic centre and surrounding.
(Source: Space Syntax Ltd. 2006.)

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Visual fields

Hillier (2003b) contends that cities are about *both* seeing and going and that they are structured, both to make the physical movement of bodies efficient, and to be intelligible to minds. While longer lines inform of the structure of the system, the shorter lines, result in a complex structure increasing visual as well as metric distances. The *visual integration analysis* of the city centre also informs of the structure of the system [*Fig. 4.3e]*. It picks out a structure similar to the axial analysis. Though the city is unintelligible as a whole when viewed syntactically, the visual integration and axial integration [*Fig. 4.3c]* highlights the long lines of the system that inform the navigator of the city's structure.

Oxford centre shows varying characters, both spatial and in the visual fields. The closing of vistas of the Medieval layout drifts to open and wide Renaissance vistas seen in the Northward expansion of St. Giles Road and Parks Road. While narrow streets and closing vistas are characteristic of Medieval setting, the use of axiality and large open spaces are characteristic of this Renaissance area. The modern expansions such as that of the West End discussed in the preceding section gives rise to a restrained form of visual access [*Fig. 4.3e]*.

Fig. 4.3e – Visual Integration map of the centre.

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Land use

The North-South axis forms a distinct line of separation between the university life structured to the East and the civic life to the West [*Fig. 4.3f*]. Also as reviewed in the Historic Background (Chapter 3 and *Fig. 3.1b*), the colleges of the University form an assemblage over a large area of the centre and further expansion and developments of the College departments show large amassment to the East of the axis. As Oxford served as a market town to the University, the micro-economic activity thriving within proximity of the Colleges, compelled the city to grow organically yet nucleating the medieval town. Over the centuries, residential dwellings and blocks of commercial use developed both within and in the immediate vicinity of the city centre.

STREET-FRONT RETAIL STORES

COLLEGES AND OTHER HISTORIC SITES

DEPARTMENTS OF THE COLLEGES
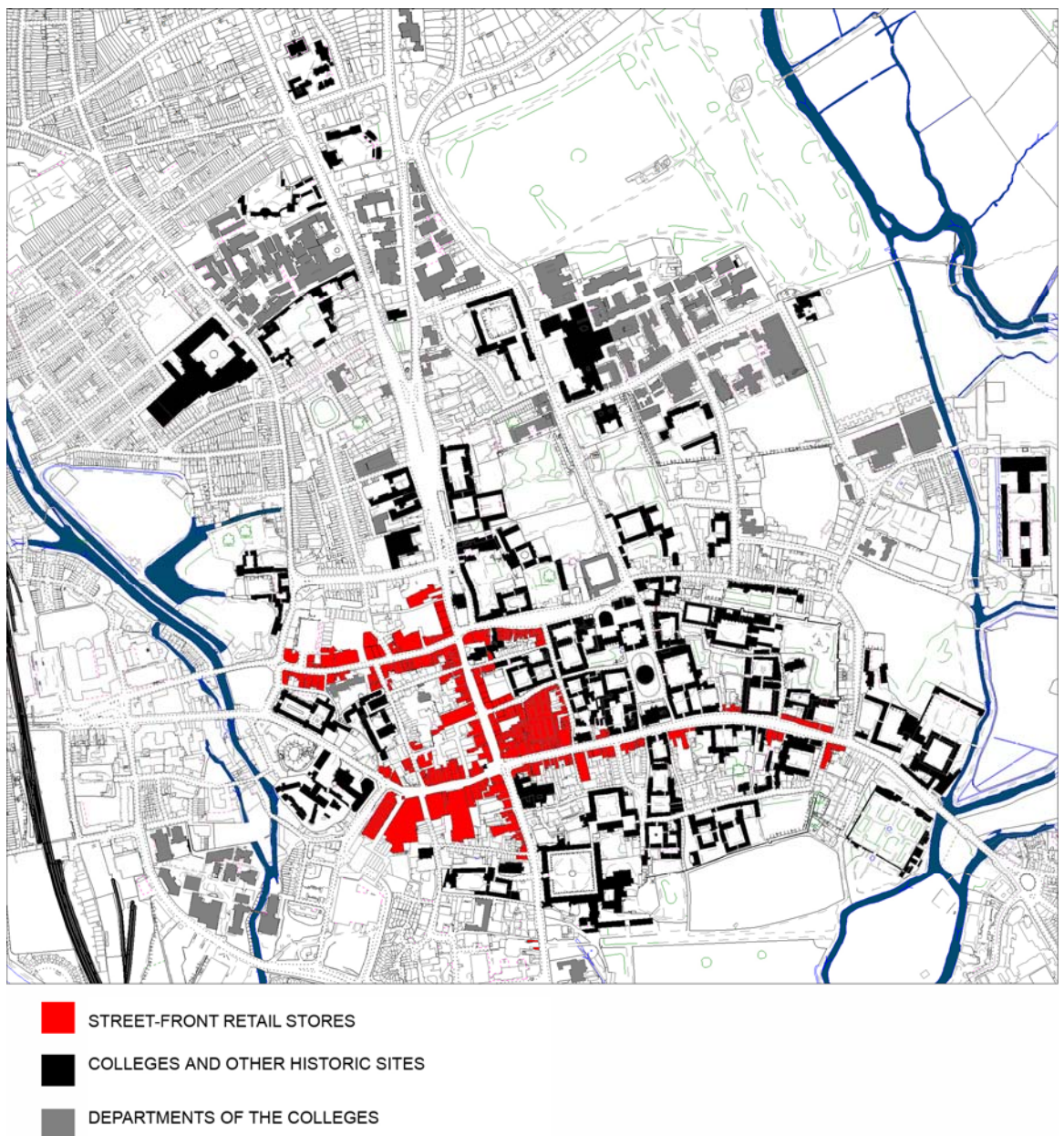
Fig. 4.3f – Map of Colleges, Departments, Historic sites and Street-front Retail.

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4.4 MOVEMENT PATTERNS

The centre of Oxford, is accessed by distinct user groups, the *Resident*[v] group of Local inhabitants and Students as well as the *Visitor*[vi] Group of Tourists. The 'movement pattern' analysis intends to show the relationship between the impact of the historic growth, and the spatial and functional differences on the movement patterns of the user groups and the consequent impact on the micro-economic activity and use of public space.

Axial Model

For purpose of movement analysis, the axial map of a smaller area was considered [*Fig 4.4a*] and is referred to hereon as the 'axial model'. A number of factors discussed earlier impact on movement and is reflected in the syntactic analysis of the street network [*Fig.4.4b*]. The *Integration Rn* analysis highlights the structure of the city; picking out the Cornmarket Street, St Aldate's and St Giles Road which form part of the North-South axis as the most integrated followed by Queen Street-High Street which runs along the East–West axis. The *choice* analysis also highlights the primary street structure and accentuates the significance of the North-South route (the former trade route) which passes through Cornmarket Street [*Fig 4.4a*].

Fig. 4.4a- Integration Rn (HH) and Choice measure for the axial model.

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GLOBAL INTEGRATION VALUES

2.01 to 2.05
1.83 to 1.92
1.74 to 1.83
1.65 to 1.74
1.56 to 1.65
1.47 to 1.56
1.38 to 1.47
1.29 to 1.38
1.2 to 1.29
1.11 to 1.2
1.02 to 1.11
0.93 to 1.02
0.84 to 0.93
0.75 to 0.84
0.66 to 0.75
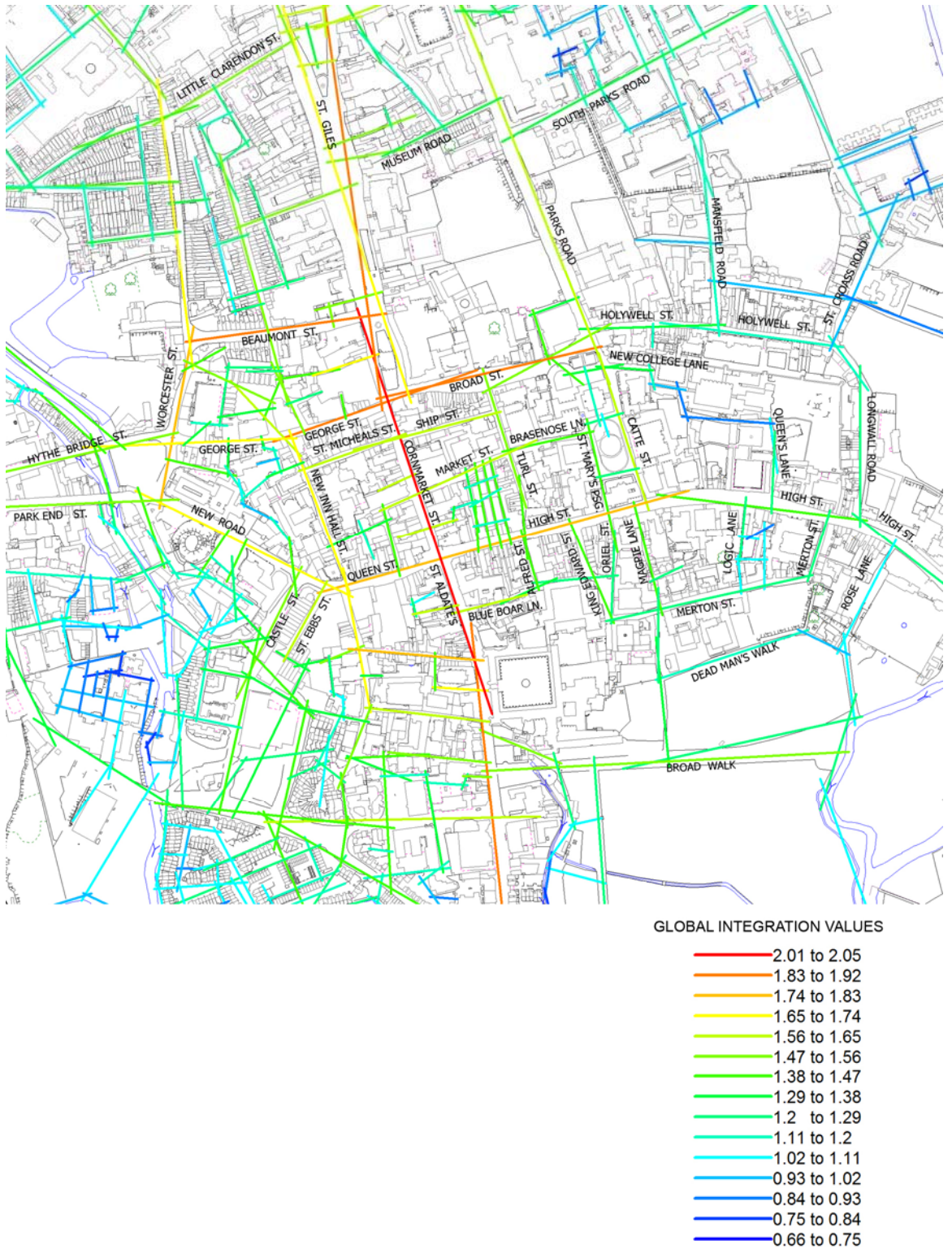
Fig. 4.4b- Global Integration Rn (axial model enlarged at city centre).

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Data Analysis

Density of movement in urban spaces are determined in mainly by the relation of spaces to the layout as a whole, and secondarily by the location of magnets (Hillier et al 1987) such as *shopping* (in case of Residents) and *attractions* (in case of Tourists). In the case of Oxford, there is a stark distinction in the distribution between shopping (and residential) activities and the Colleges of the University (and departments) which are also sites of tourist attraction [*Previous section Fig. 4.3f*].

The hypothesis built up and tested further, is that in Oxford there is a distinction is the co-presence of users, between the 'Town and the Gown' and between 'Residents and Visitors' as the spatial structure affects the inhabitants and the visitors in a varied way.

The data analysis put forth is used to analyse the urban structure [*Fig. 4.3a-4.3f*] in affecting the movement patterns and probabilistic encounter of its user groups. A set of 60 gates, 40 of which form part of the historic core (30 within the medieval layout) are chosen for observation under the Gate Method as an initial analysis of movement patterns.

Movement of the Visitor- The Tourist

In a study of Urban Space morphology and Urban Tourism, Gospodini (2001) refers to Boerwinkel's (1995, cited in Gospodini 2001, p.929) distinction in the order of buildings in urban tourism. The two types of spatial order are namely the 'successive arrangement' and 'simultaneous arrangement' of artefacts in the urban spatial system. The former conforms to an order whereby there is a step-by-step uncovering of the particular spaces to the observer in terms of both sight and movement and the latter is such that while the observer is moves, the space provides multiple choices in terms of both sight and movement.

In Oxford, the historic artefacts and public spaces occupy and spread uniformly over the spatial layout of the city centre. As the spatial layout offers multiple choice of routes to the exploring observer, the artefacts are referred to as being in 'simultaneous arrangement'. According to Gospodini and Boerwinkel, buildings and public open spaces in a 'simultaneous arrangement' are more attractive to tourists as the spatial order encourages 'free exploration' of space (Boerwinkel 1995, cited in Gospodini 2001, p.929). The discussion here focuses on the analysis of the movement of the Tourist explorer. The observed aggregated patterns of movement are studied in relation to the axial analysis. However, the key to the construction of the tourist pattern of movement is vested in the analysis of the tourist behaviour (or movement) in response to the isovists constructed by the spatial structure as discussed in *Chapter 3*.

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The majority of tourists [*Fig. 4.4c]* arrive in the city centre from the train station on Hythe Bridge Street, Gloucester Green Bus station opening onto George Street and the bus drop-off points at St. Aldates, High Street and Magdalene street. Largely, the source of movement can be defined as starting from the extremities of the central axes. This section proceeds with the analysis of the observations gathered from the Gate Method and Direction Spilt Method (*see Chapter 2*).

TOURIST DROP OFF POINTS

1   TRAIN STATION
    (EXIT ONTO HYTHE
    BRIDGE STREET)

2   GLOUCESTER GREEN
    BUS STATION

3   MAGDALENE STREET
    BUS SERVICES

4   OXFORD TUBE BUS
    DROP OFF POINT
    ON HIGH STREET

5   OXFORD TUBE BUS
    DROP OFF POINT
    ON ST. ALDATE'S

    BUS COMPANY
    ROUTE

BUS COMPANY ROUTE (Source: Tour Map: Oxford Bus Company)

Fig. 4.4c – Origins of tourist exploration of the Historic centre.

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Exploratory Behaviour of the Tourist

Gate Count and Direction Split Method Observations

The experiment conducted on the impact of isovist properties [*Fig. 4.4d]* on the decisions taken by tourists as choice routes offers significant insights into the exploratory behavior of tourists and its relation to structured space. From the observations of the Gate count method, large number of tourists are seen to occupy the streets forming the Carfax, namely the High Street, Cornmarket Street, Queen Street and St. Aldates Street [*Fig. 4.4e].* Broad Street also shows large number of tourists. The High Street draws significant tourists exploring through its entire length as the concavity of the street offers changing vistas [*Fig. 4.4f,g,h]* in progression. The mid-section of the High Street shows fewer tourists (102 pph against 303 pph of the main section of the High Street). This is accounted for the dispersion of tourists into Turl Street and Catte Street at its one end, and Queen's Lane and Merton Street at its other ends, as captured by the Direction Split observation.

The Direction split method [Refer *Fig. 4.4 h,i,j,k*] accounting for the number of tourists (a pair or group is considered here as a single unit) accessing the streets of the substructure (accounted every fifteen minutes) accentuates the effect of the isovists on tourist dispersion from the High Street. Streets like Catte Street, Merton Street and Queen's Lane with their distinct visual fields draw tourists in large numbers while streets such as Logic Lane, Magpie Lane, Alfred Street, Oriel Street and King Edward Street show significantly low number of tourists choosing the route unless using a map to browse the space. Magpie Lane draws low number of tourists from the High Street but a large number of tourists and tourist groups from Christ Church Meadows use the street to egress onto the High Street.

Observations at Cornmarket Street[*Fig. 4.4i,k*] shows large number of tourists from George Street choosing Cornmarket Street as the isovist at the junction is of St. Michael's Church on Cornmarket and the Tom Tower on St Aldates. Cornmarket Street and St. Aldates Street subsequently shows highest numbers of tourists (432pph and 315pph respectively) [Fig. 4.4e,I,k]. Observations at Broad Street [*Fig. 4.4 j,k*] also reflect the response of tourists to Isovist properties of the layout which correspond to the aggregate movement [*Fig. 4.4k*].

The aggregate movement of tourists [*Fig. 4.4e*] shows a higher concentration of tourists in the Medieval area of the city around the Colleges of the University and fewer numbers towards the University Museum, Holywell Street and on St. Giles Road beyond the Martyr's Memorial. These streets show lesser tourists as there is loss of visual link (wide and broad Renaissance vistas) along Parks Road leading to the Museum and St. Giles Road leading to other Colleges, historic pubs and other sites of historic interest.

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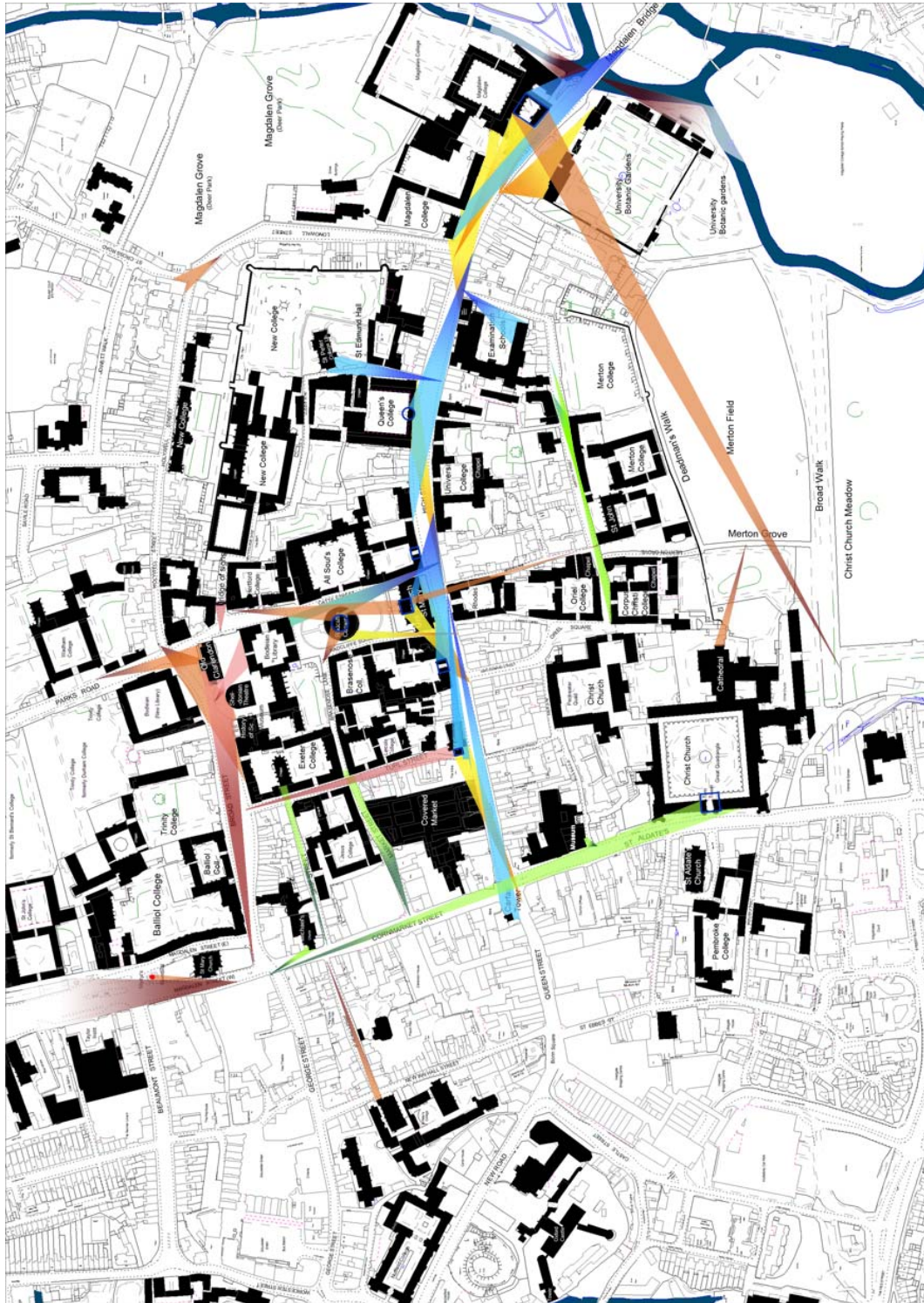
Fig. 4.4 d – Map showing range of isovists.

HOURLY MOVEMENT OF
TOURISTS

	465 to 495
	403 to 434
	372 to 403
	341 to 372
	279 to 310
	248 to 279
	217 to 248
	186 to 217
	155 to 186
	124 to 155
	93 to 124
	62 to 93
	31 to 62
	0 to 31
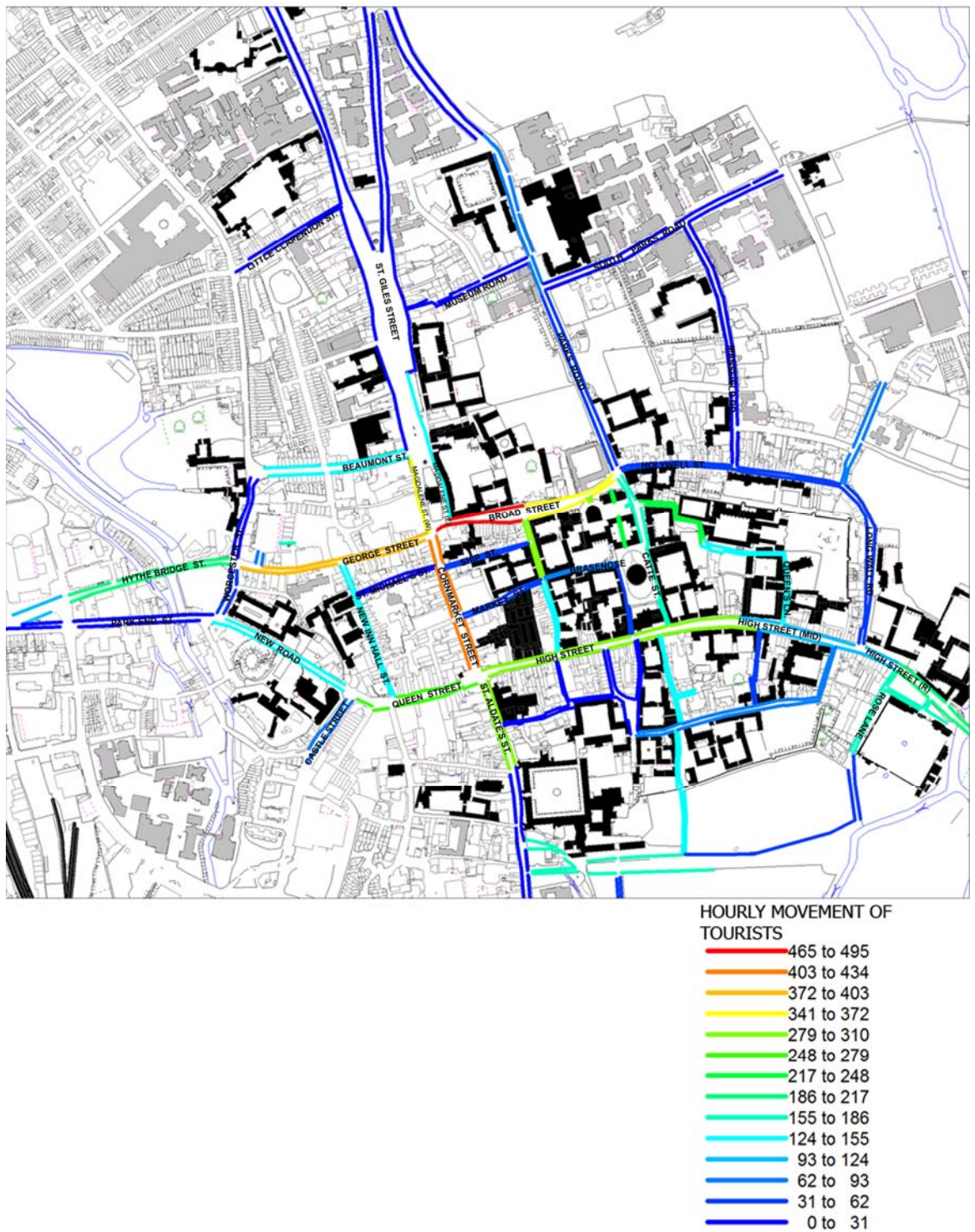
Fig. 4.4e- Aggregate Tourist Movement mapped on the Spatial Network.
(Refer to Bar Chart in Appendix-3, App-3.3)
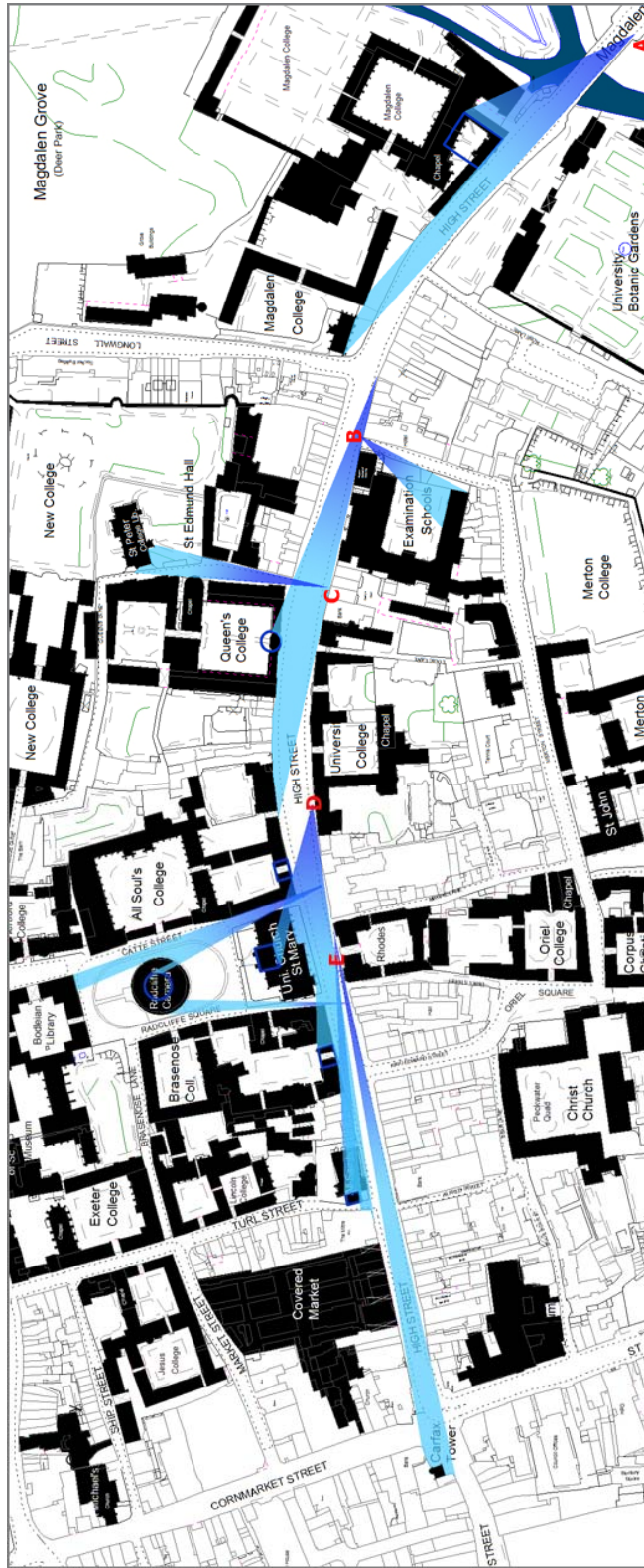
A- View of Mary Magdalene College from Magdalene Bridge.

B- View of the courtyard building of Examination school.

C- View of St. Peter's Church library in Queen's lane.

D- View of Brasenose College upto All Saints Church.

E- View of Brasenose College, All Saints Church upto Carfax Tower.

Fig. 4.4f- Range of Isovists along the High Street.

D- View of Mary Magdalene College

C- View of the dome and the Rotunda of Radcliffe Camera

B- View of Brasenose College and Church of St. Mary the Virgin

A- View of All Saint's Church

Fig. 4.4g- Range of Isovists along the High Street.
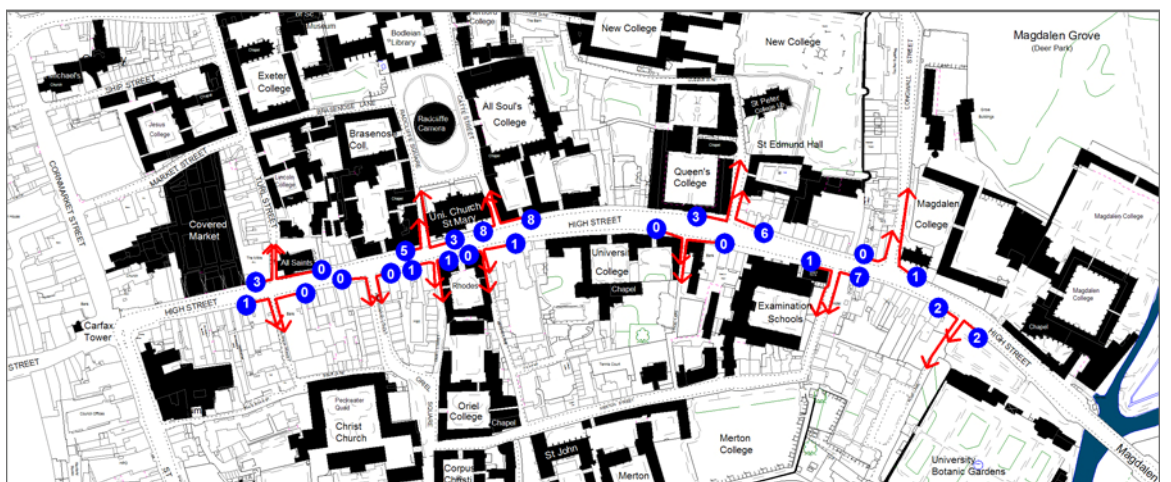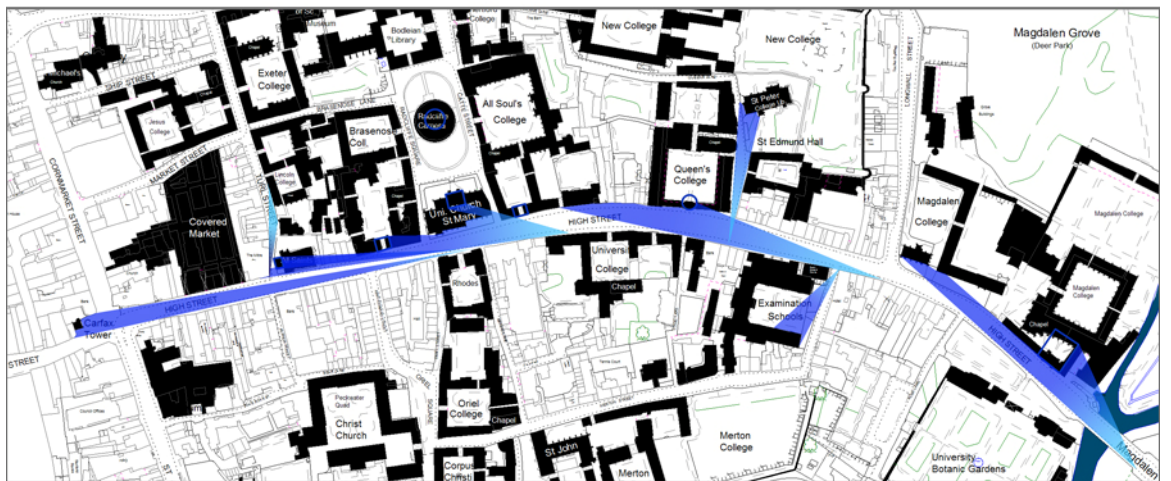
Fig. 4.4h- Units (Individuals or Groups) of Tourists entering the streets in response to the isovists.
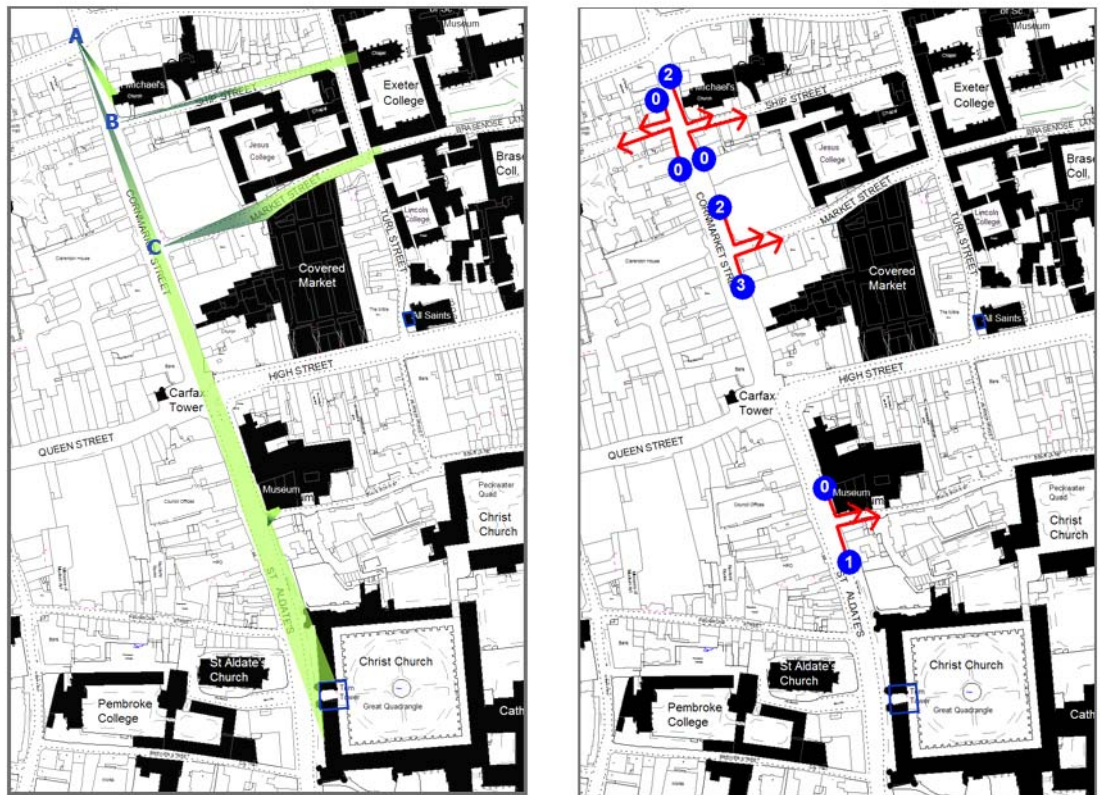
A- View of St. Michael's Church (on Cornmarket street) and the Tom Tower of Christ Church (on St. Aldate's) seen from the junction of George Street and Broad Street.

B- View of Exeter Chapel on Ship Street.

C- View of facade of Covered Market and its sign board on Market Street.

Fig. 4.4i – Range of isovists from Cornmarket Street and response of tourists.
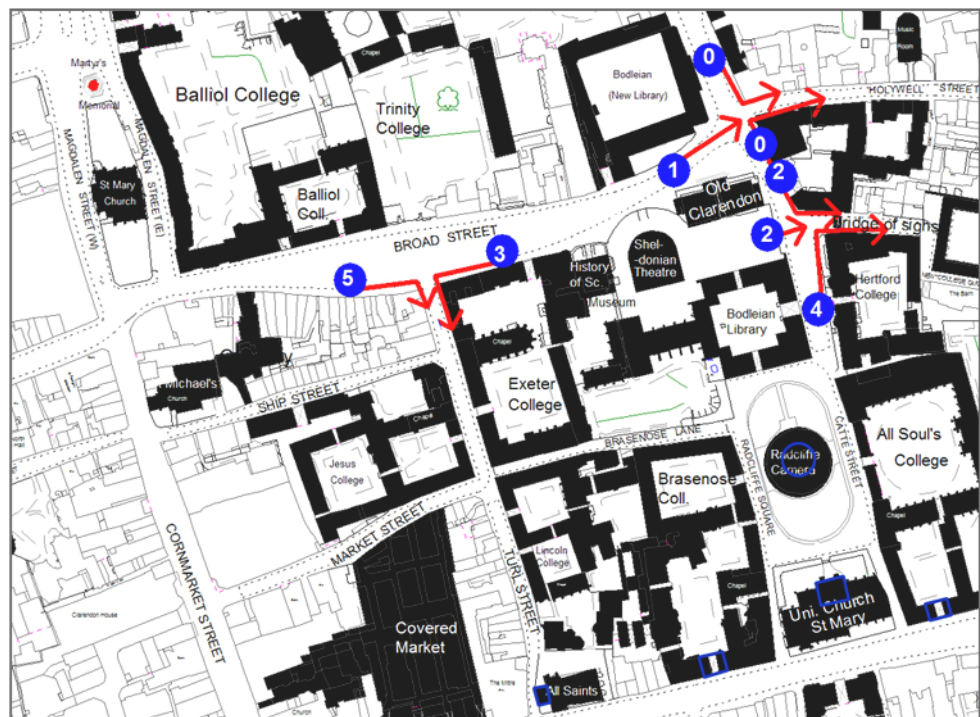
Fig. 4.4j – Range of Isovists on Broad Street and tourist response to the isovists.

STREET	ISOVIST	TOTAL NO. OF TOURIST (UNITS) ENTERING/15MIN (DIRECTION SPLIT METHOD)	TOTAL NO. OF TOURISTS/ HOUR (in and out)(GATE METHOD)
FROM HIGH STREET INTO			
TURL STREET	LINCOLN COLLEGE FAÇADE	3 UNITS	132
ST. MARY'S PASSAGE	RADCLIFFE CAMERA	8 UNITS	60
CATTE STREET	RADCLIFFE CAMERA	16 UNITS	162
QUEEN'S LANE	ST. PETER'S CHURCH	9 UNITS	144
LONGWALL STREET	-	1 UNITS	54
ROSE LANE	BOTANICAL GARDEN	4 UNITS	168
MERTON STREET	EXAMINATION SCHOOL COURTYARD AND BUILDING	8 UNITS	72
LOGIC LANE	-	0 UNITS	36
MAGPIE LANE	-	1 UNITS	144
ORIEL STREET	-	2 UNITS	24
KING EDWARD STREET	-	0 UNITS	24
ALFRED STREET	-	1 UNITS	24
FROM CORNMARKET STREET INTO			
ST MICHAELS STREET	-	0 UNITS	0
SHIP STREET	EXETER COLLEGE CHAPEL	2 UNITS	48
MARKET STREET	COVERED MARKET FAÇADE	5 UNITS	51
FROM BROAD STREET AND CATTE STREET INTO			
TURL STREET	ALL SAINTS CHURCH	8 UNITS	279
HOLYWELL STREET	-	1 UNIT	60
NEW COLLEGE LANE	BRIDGE OF SIGHS	8 UNITS	240

Fig. 4.4k – Table of Direction Split and Gate Method Observations.

Movement of Resident population

Gate Count Method Observations

The movement data of Locals *[Fig. 4.4l]* and students *[Fig. 4.4m]* mapped on the spatial network shows higher occupancy (higher degree of co-presence among Residents) along the primary shopping streets at the centre. The table [*Fig. 4.4n*] also shows the higher presence of Locals and Students on these streets.

HOURLY MOVEMENT OF
LOCAL INHABITANTS

2,250 to 2,390
1,650 to 1,800
900 to 1,050
750 to 900
600 to 750
450 to 600
300 to 450
150 to 300
0 to 150
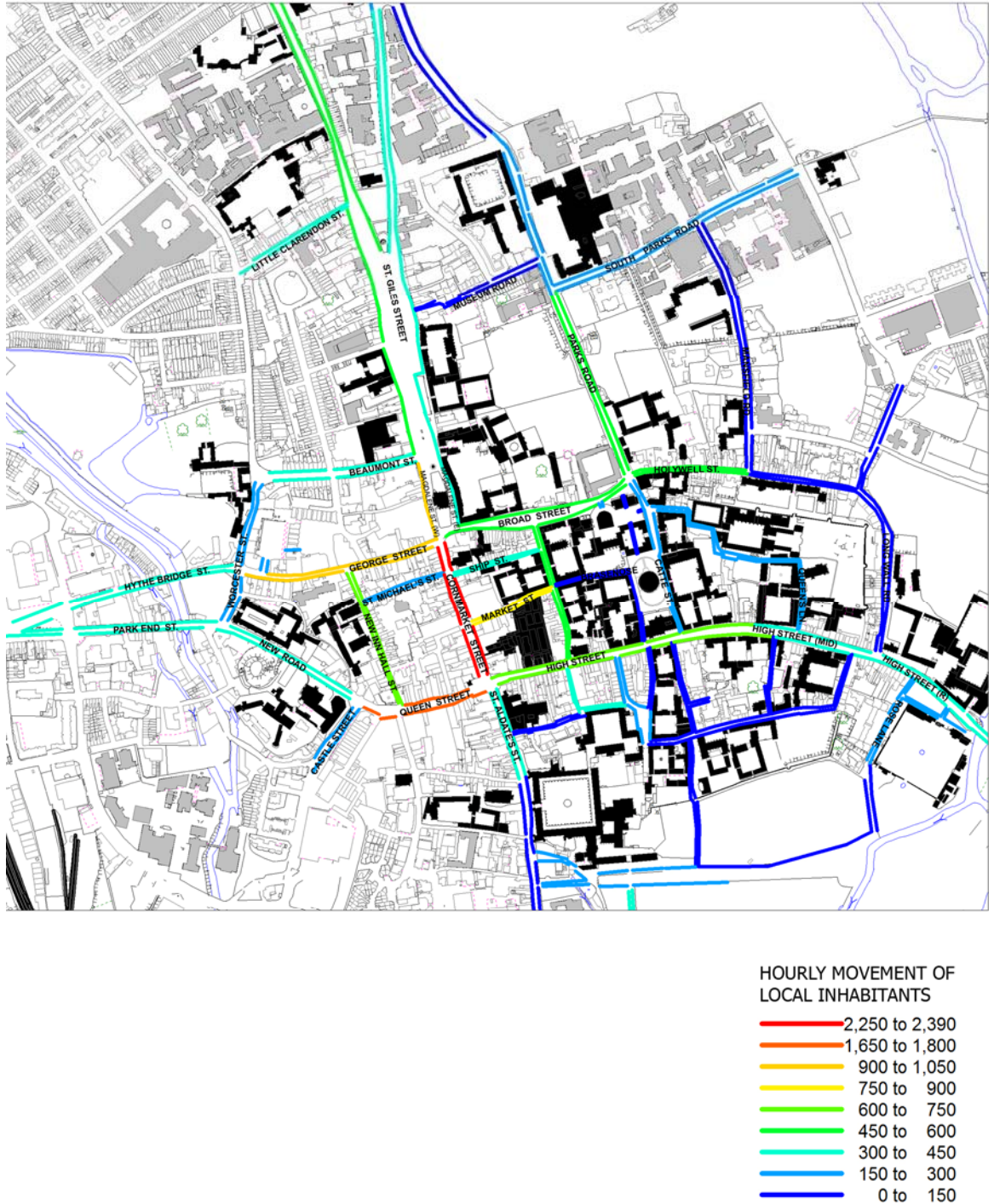
Fig. 4.4l - Aggregate Movement of Local inhabitants mapped on the Spatial Network.
(Refer to Bar Chart in Appendix-3, App-3.1)

HOURLY MOVEMENT OF STUDENTS

▬▬	780 to 835
▬▬	572 to 624
▬▬	416 to 468
▬▬	364 to 416
▬▬	312 to 364
▬▬	260 to 312
▬▬	208 to 260
▬▬	156 to 208
▬▬	104 to 156
▬▬	52 to 104
▬▬	0 to 52
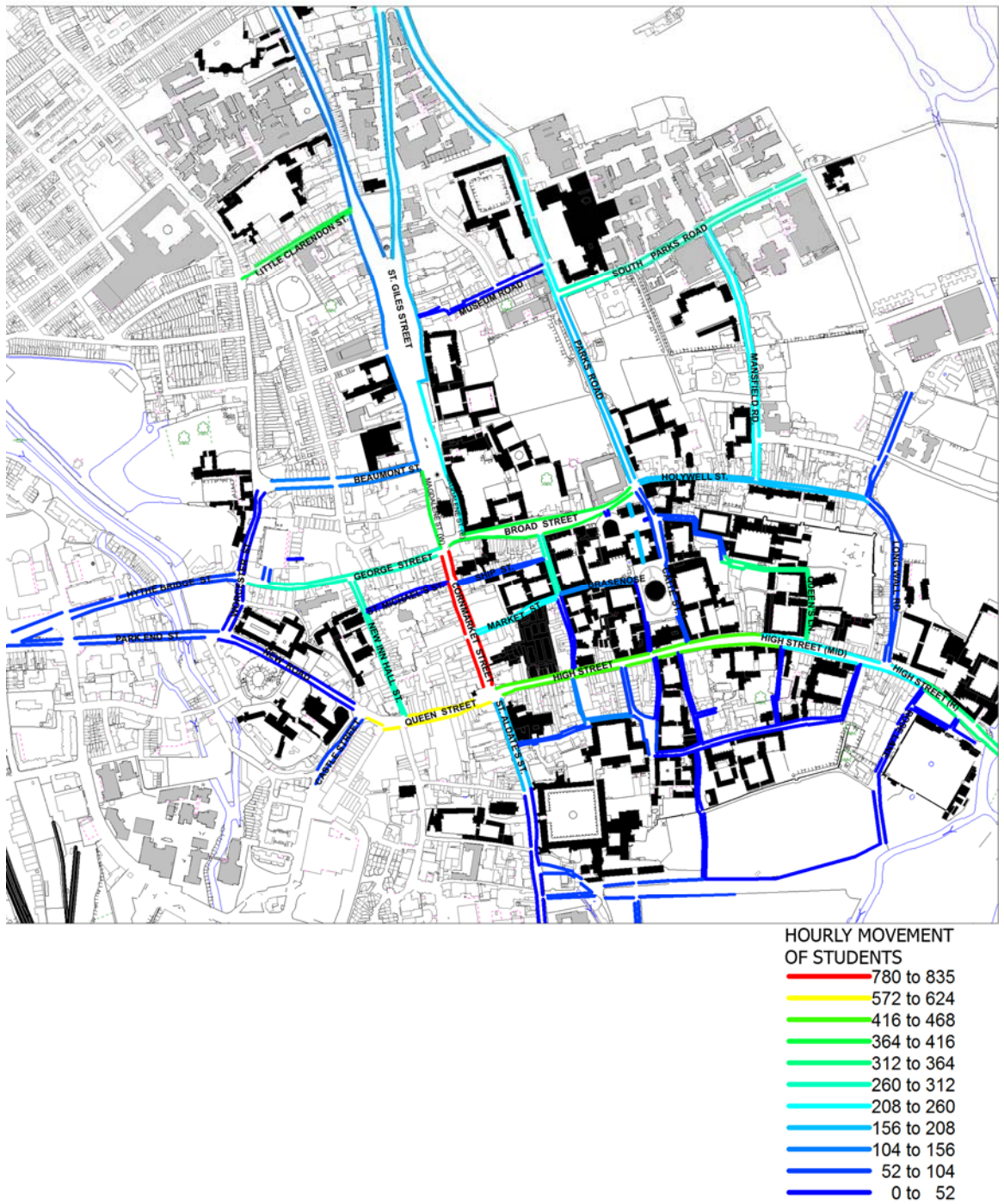
Fig. 4.4m- Aggregate Movement of Students mapped on the Spatial Network.
(Refer to Bar Chart in Appendix-3, App-3.2)

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	STUDENTS ABOVE 600 pph	STUDENTS 350-600 pph	STUDENTS 200-350 pph
LOCALS ABOVE 1500 pph	• CORNMARKET STREET • QUEEN STREET		
LOCALS ABOVE 500 pph		• MAGDALENE STREET • HIGH STREET • BROAD STREET	• NEW INN HALL STREET • GEORGE STREET • MARKET STREET • TURL STREET

Fig. 4.4n- Table of Streets conforming to Density of Resident Group.

The scattergram of correlation between 'Choice and Integration' for these streets [*Fig. 4.5p*] (exhibiting high co-presence between the Resident Group of Locals and Students) indicates an R2 of 0.88 *[Fig. 4.4o]* which conforms to their function as Shopping Streets benefiting from passing trade. 'Integration' measures the mean depth of every line in the system in relation to other lines, relativised conforming to their possible depth with that number of lines (Hillier and Hanson 1984 pp:108, Hillier et al 1993). The degree of 'Choice' for each space represents its likelihood as a route of choice, on all the shortest routes from all spaces to all other spaces in the system (Hillier et al 1993). This correlation between Integration and Choice as put forth by Hillier, indexes the degree of alliance between space's potential for *to-movement* and *through-movement* (Hillier et al 1987 p.237). The scattergram also shows a good correlation between movement of Inhabitants and the measure of Choice [*Fig. 4.4q*] for these streets at the Oxford city centre.
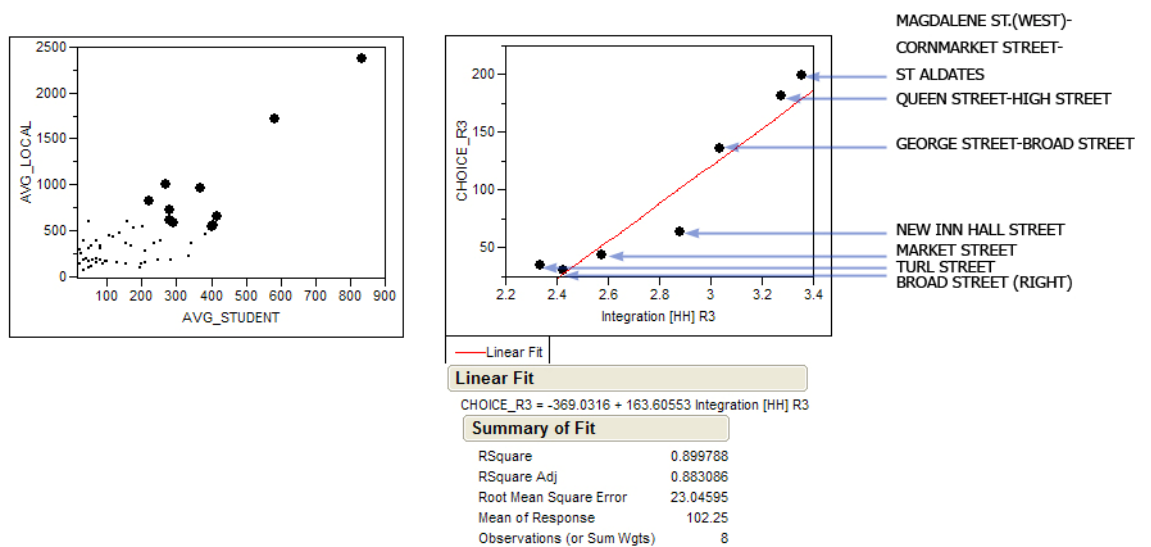
Fig. 4.4o-Shopping streets and Hierarchy of Shopping conforming to Local movement.

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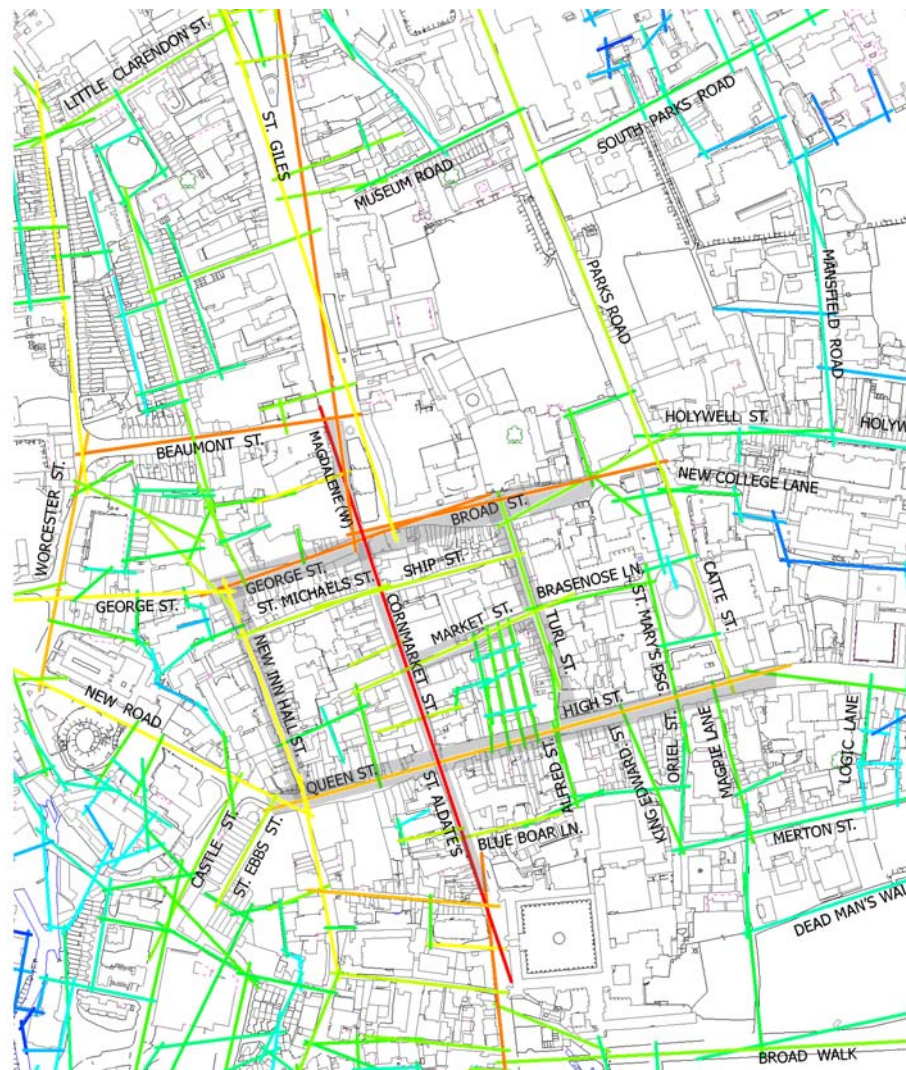
Fig. 4.4p- Shopping Streets (Integration Rn for axial model).
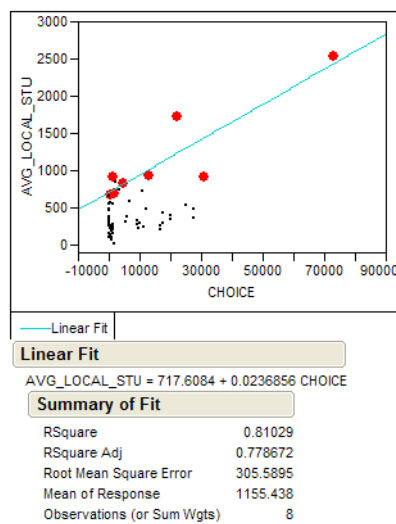
Fig. 4.4q- Correlation of Resident Movement against Measure of Choice.

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Thus, from the analysis of the urban structure reflecting the differentiation in land use patterns, urban block sizes with restrained permeability and visible permeability, the aggregate movement of pedestrians is higher along the Shopping streets at the centre. The significance of these routes is that they conform to Choice routes at the Local scale network besides Cornmarket Street and the High Street which routes of high Choice at the Global Scale network of the city. The tourist movement, as suggested by the analysis, is aided significantly by the afforded visual fields as well as by the topology of the street network, which allows choice of routes in experiencing the historic and scenic artefacts. The following section further reviews the co-presence on the street network in relation to the public space of the street, square and park.

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4.5 CO-PRESENCE – MICRO STUDY OF THE PUBLIC DOMAIN

Co presence: The Street

From the aggregate tourist movement, it is observed that the Shopping Streets of George Street, Queen street and New Inn Hall Street show high tourist occupancy in addition to Cornmarket Street and Broad Street. Probably, this is due to the location of the Train station and Bus station off these routes as tourists access these routes to reach sites of interest at the centre [*Fig. 4.5a*]. The correlation between 'Integration and Choice' [*previous section Fig. 4.o*] also highlights these streets which signifies the degree of "movement interface" between inhabitants and strangers as it expresses the degree of correlation between two types of movement pattern, those with lesser knowledge of the layout; and that of inhabitants, with much better knowledge of the layout (Hillier et al 1987 p.237).

| A - TRAIN STATION | B- BUS STATION | RETAIL | SITES OF TOURIST INTEREST |

| 1- NEW ROAD | 2- GEORGE STREET | 3- BEAUMONT STREET | 4- NEW INN HALL STREET | 5- QUEEN STREET |
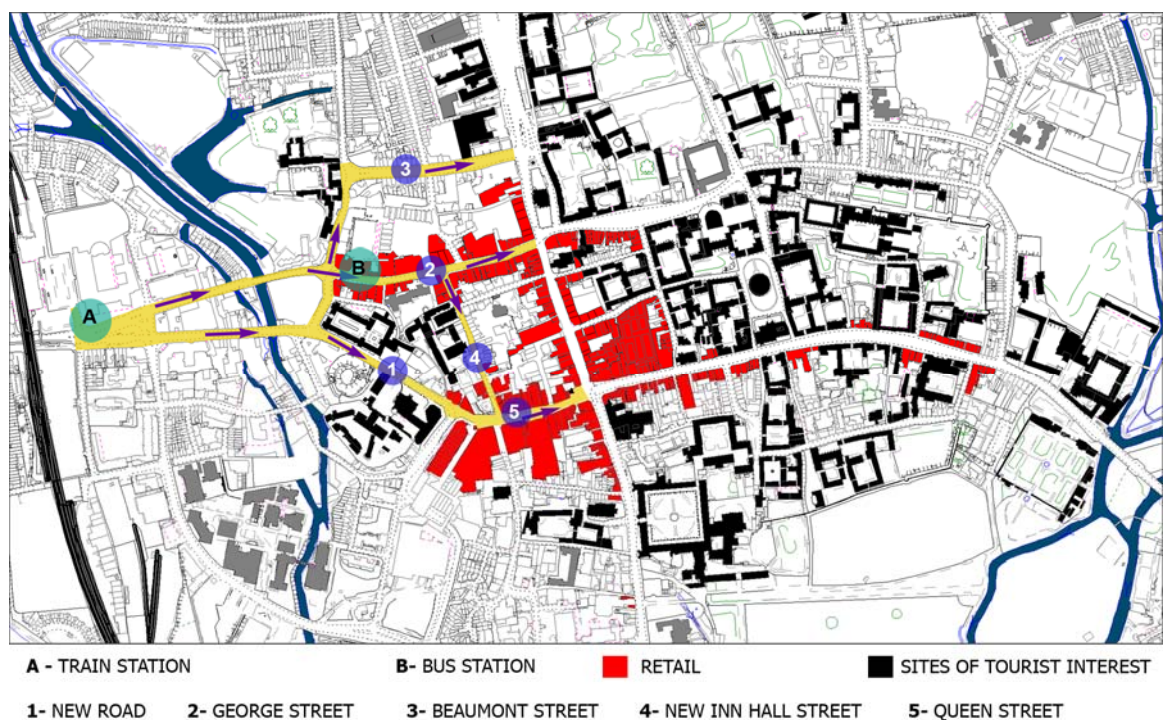
Fig. 4.5a- Location of Train and Bus Station and access routes to the Sites of Interest.

In a field study of the Shopping Categorisation as put forth in the Research Methodolgy (see Chapter 2), it was observed that the location of Shops catering to Tourists and Students are predominant on Broad Street, Turl Street and a section of the High Street [*Fig. 4.5b*]. This questions the co-presence of user groups on the streets that reflects on the categories of Stores. The scattergrams [*Fig. 4.5c*] between tourist and local movement indicates a high co-presence of 'Students and Tourists' on Broad Street and High Street as against the presence of 'Locals' or the combined co-presence of the Resident group. Turl Street on the other hand, shows the Resident group and the Tourist group accessing in equal numbers and the stores

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cater uniformly to all groups. Thus, with the degree of co-presence between the Tourist and Resident Group being higher along the Shopping streets especially at the Carfax, the co-presence of the groups in the street network seems to be strongly related to the shopping characters of each of the streets.

- ■ COMMON (RESTAURANTS, PUBS, CINEMAS)
- ■ SHOPPING OF RESIDENT INTEREST
- ■ SHOPPING OF RESIDENT OR TOURIST INTEREST
- ■ SHOPS CATERING TO STUDENTS
- ■ STORES OF UNIVERSITY MERCHANDISE (TOURIST AND STUDENT)
- ■ CURIO SHOPS,TOURISM SHOPS AND OFFICES, OXFORD MUSEUM

Fig. 4.5b – Thematic map of Shopping Categorisation.
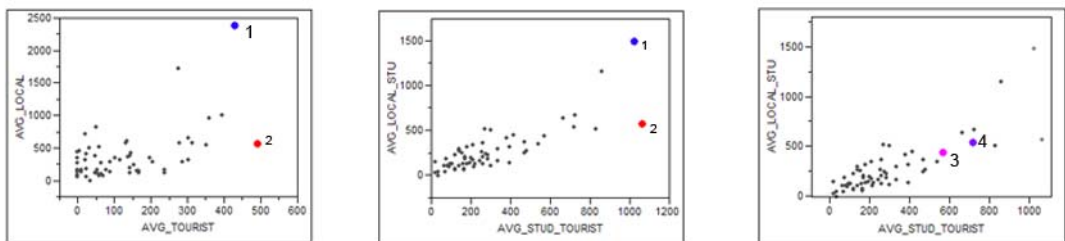
- 1 ● CORNMARKET STREET
- 2 ● BROAD STREET
- 3 ● TURL STREET
- 4 ● HIGH STREET

Fig. 4.5c – Co-presence on the Shopping Streets.

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Co Presence: Public space: Squares and Parks

The analysis of Tourist movement suggests that, it is largely affected by the visual fields made available whilst exploring the historic environment resulting in low tourist movement in visually segregated streets. The Local inhabitants on the other hand show presence in high numbers on the superstructure, which are streets of high choice and high integration.

This section further outlines the use of public spaces at the city centre in relation to their location and movement patterns of the Resident and Tourist Group. The location of the public spaces on the Visual Integration Map [*Fig. 4.5d*] highlights spaces, which are visually segregated in the public realm. There is also a strong correspondence between the average visual depth of the public space (from all tourist drop of points) and the number of tourists accessing the adjoining streets [*Fig. 4.5e,f*].
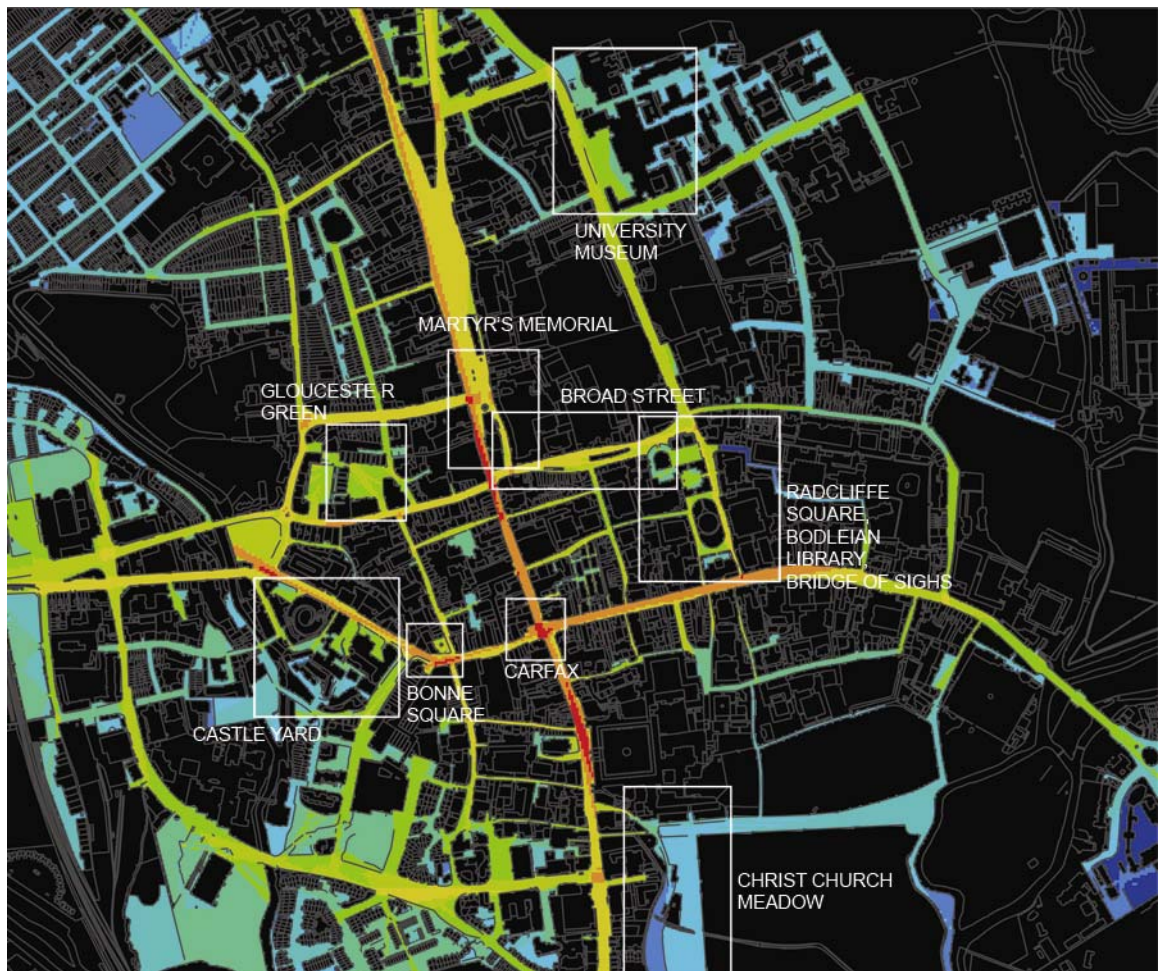
Fig. 4.5d– Locations of Public spaces overlaid on Visual Integration map.
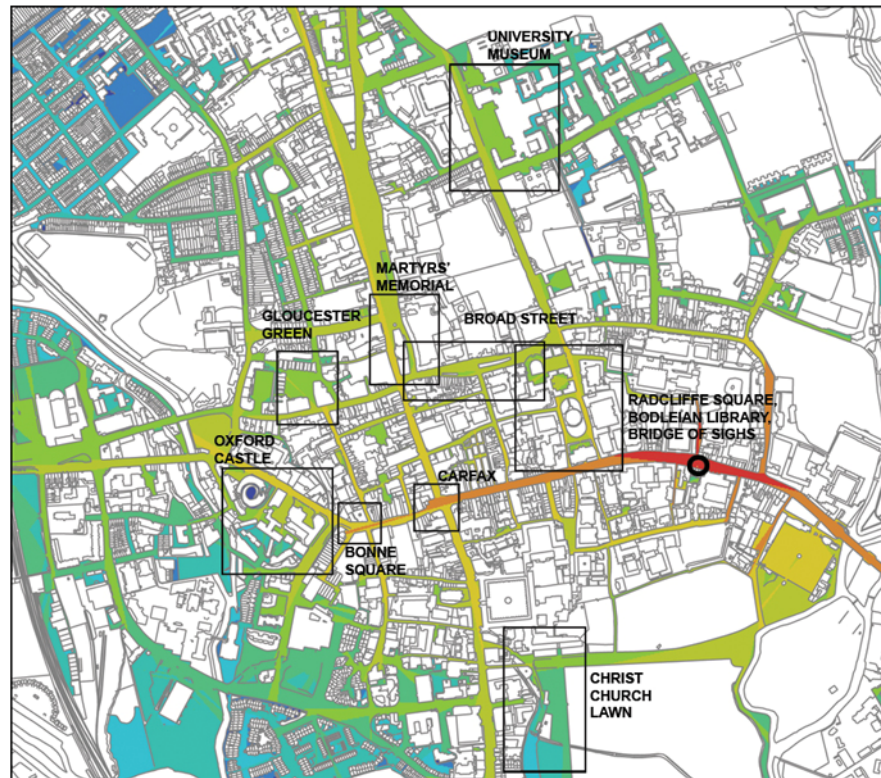
VISUAL STEP DEPTH FROM THE HIGH STREET DROP OFF POINT
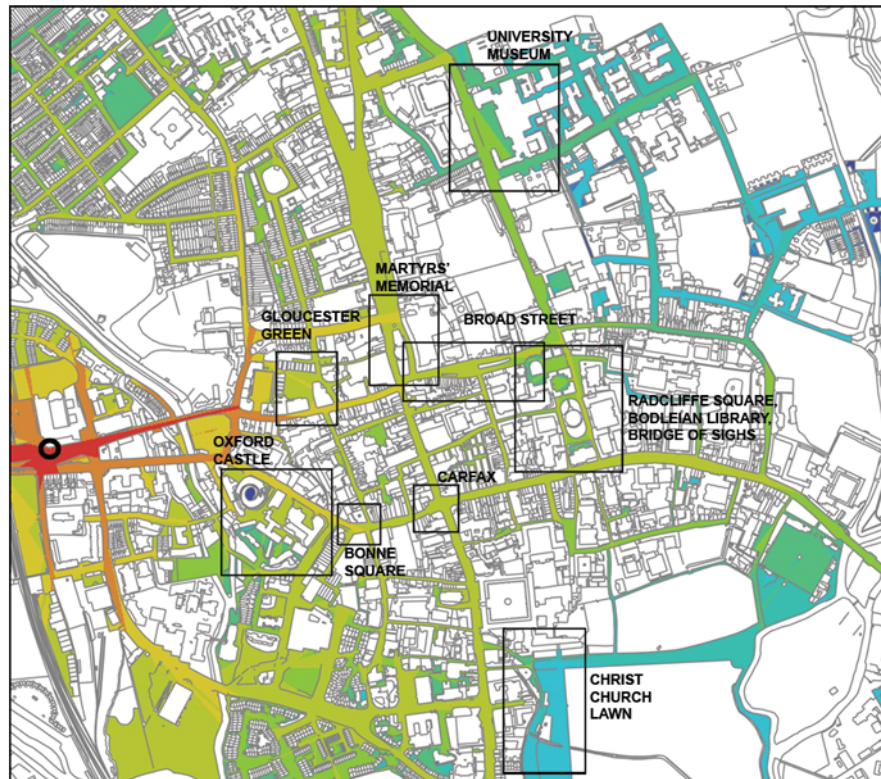
VISUAL STEP DEPTH FROM THE TRAIN STATION

Fig. 4.5e– Visual Step Depth from the High Street (above) and Train station (below).
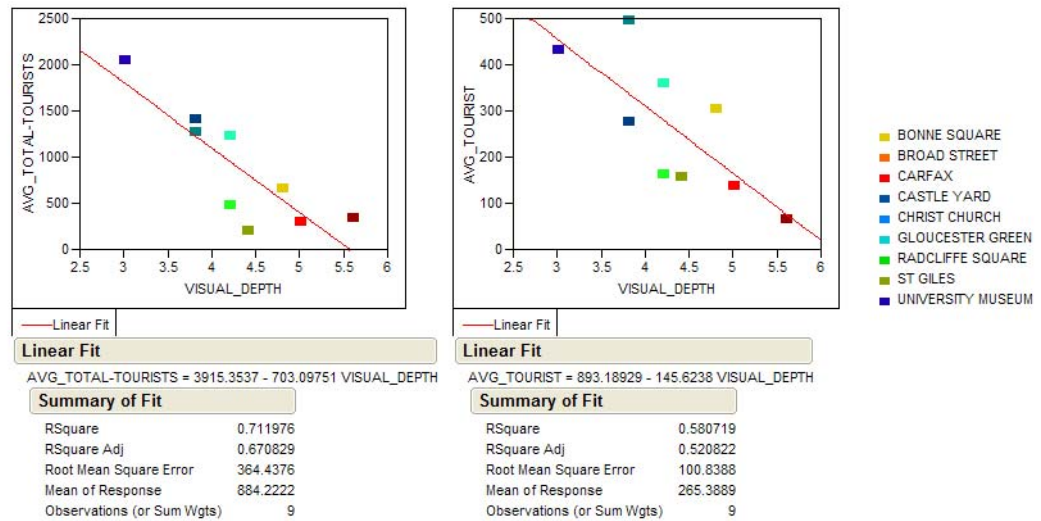
4.5f –   Co-presence of Tourists on streets adjoining the Public spaces correlated against their average visual depth from the Tourist Drop off Points.

The following section outlines the co-presence of the User groups in the public squares, and recreations and leisure spaces and the use of space appropriated by the groups. The spaces discussed are introduced briefly in table [*Fig 4.5g*] and are discussed further below.

	TYPE OF SPACE	AVG. VISUAL DEPTH	ADJOINING STREETS
RADCLIFFE SQUARE	SQUARE	4.2	CATTE STREET ST MARY'S PASSAGE
CARFAX	STREET JUNCTION	3	CORNMARKET STREET HIGH STREET ST. ALDATES QUEEN STREET
BONNE SQUARE	SQUARE	3.8	NEW INN HALL STREET ST EBBS STREET QUEEN STREET
MARTYRS' MEMORIAL	SQUARE	4.2	BEAUMONT STREET ST. GILES STREET MAGDALENE STREET(W and E)
BROAD STREET	STREET	3.8	GEORGE STREET HOLYWELL STREET PARKS ROAD, CATTE STREET MAGDALENE STREET (Wand E) CORNMARKET STREET
GLOUCESTER GREEN	SQUARE	4.4	GEORGE STREET WORCESTER STREET
CHRIST CHURCH MEADOW	PARK	4.8	ST. ALDATES NEW WALK AND BROAD WALK
OXFORD CASTLEYARD	LEISURE	5	NEW ROAD CASTLE STREET PARADISE STREET
UNIVERSITY MUSEUM LAWN	MUSEUM LAWN	5.6	PARKS ROAD

Fig. 4.5g- Table of Public Spaces and adjoining Street network.

Radcliffe Square, Bodleian Library, Bridge of Sighs [*Fig.4.5h,i,j*]

The Radcliffe Camera, its dome and Rotunda attracts tourists into Radcliffe square from the neighbouring street structure, as a tourist gets dynamic views of Bodleian library, the University Church and Radcliffe Camera itself. The Radcliffe square brings the tourist into an interface with the students of the University who access the Bodleian and Radcliffe Library. Catte Street, flanking the square is also used by local inhabitants to access and egress from the High Street. Catte Street forms the link between the High Street and the departments, student housing and other colleges on Parks Road. However, large number of tourists visit over the weekend and dominate the space at the Bodleian, Sheldonian Theatre and Radcliffe square. The area fronting the Bridge of Sighs shows high co-presence between the tourists themselves and the passing inhabitant interfaced with the Historic facet. The access to the University Church of St. Mary The Virgin, which is open to public, is fronted by a lawn with dining facilities of the cafeteria. The lawn is however shielded by hedges and is set out of view of most tourists who bypass the square without knowledge of the lawn.

AXIAL MAP SHOWING GLOBAL INTEGRATION RN

1- OLD CLARENDON 5- BODLEIAN LIBRARY
2- SHELDONIAN THEATRE 6- ALL SOULS COLLEGE
3- BRIDGE OF SIGHS 7- RADCLIFFE CAMERA
4- HERTFORD COLLEGE 8- BRASENOSE COLLEGE
9- CHURCH OF ST. MARY THE VIRGIN

Fig. 4.5h- Radcliffe Square: Axial representation.

ENLARGED VISIBILITY GRAPH

- HOLYWELL STREET
- NEW COLLEGE LANE
- SHELDONIAN COURTYARD
- BODLEIAN LIBRARY COURTYARD
- RADCLIFFE SQUARE
- ST. MARY'S PASSAGE
- CHURCH LAWN

OLD CLARENDON FROM SHELDONIAN YARD

RADCLIFFE SQUARE

TOURISTS AT THE BRIDGE OF SIGHS ON CATTE STREET

TOURISTS AT RADCLIFFE SQUARE

TOURISTS AT CATTE STREET FACING RADCLIFFE CAMERA

BODLEIAN LIBRARY COURTYARD

ACCESS TO BODLEIAN LIBRARY

TOURISTS AT CATTE STREET AT ALL SOULS COLL. ENTRANCE

BODLEIAN LIBRARY

LAWN OF UNIVERSITY CHURCH OF ST. MARY THE VIRGIN

Fig. 4.5i- Enlarged Visibility Graph and Images.
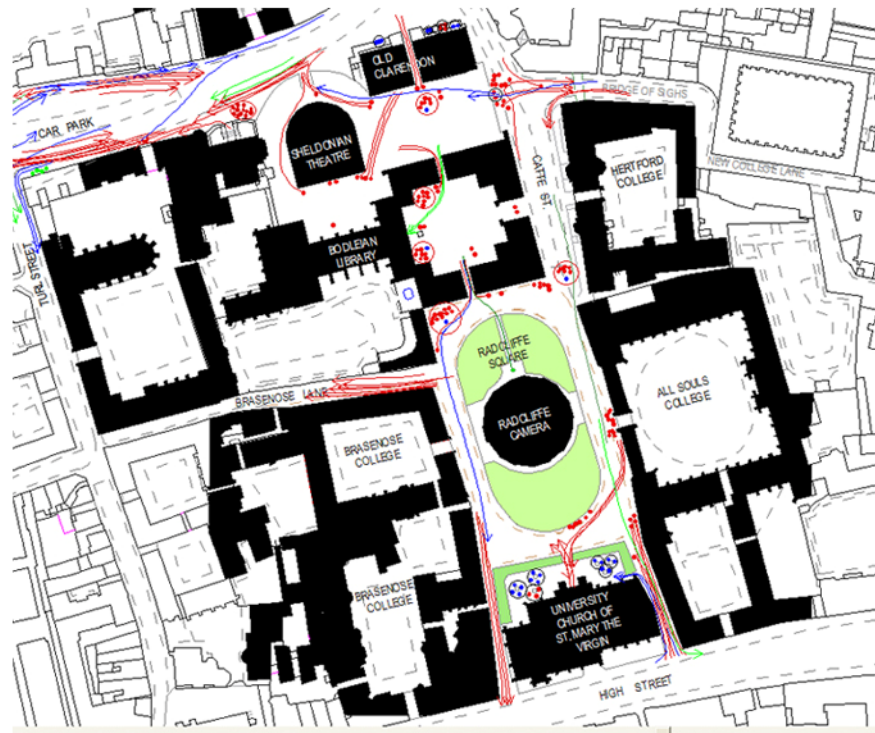
STATIC SNAPSHOTS AND MOVEMENT TRAILS (THURSDAY)
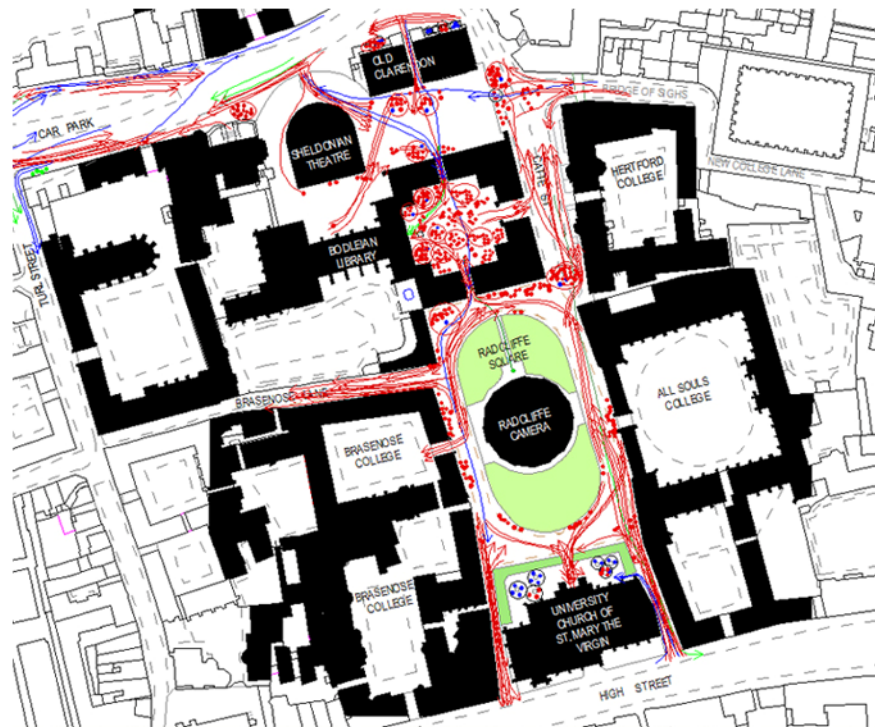
STATIC SNAPSHOTS AND MOVEMENT TRAILS (SATURDAY)

LOCAL   TOURIST GROUP   SITTING

TOURIST

STUDENT   GUIDED TOURIST GROUP

Fig. 4.5j- Radcliffe Square: Static Snaphots and Movement Trails (Thursday- above), (Saturday- below).

Broad Street [*Fig.4.5k,l*]

Broad Street as the name suggests is a large stretch of space, partly pedestrianised to the West. The section to the left shows large number of tourists, students and locals who bypass the street out of Cornmarket Street towards their vehicles on Broad Street. On the right of Broad Street, there is a significant decrease in numbers of the user groups. However, on Saturdays, this section of the Broad Street is busy with many wedding ceremonies taking place.

AXIAL INTEGRATION

1- BALLIOL COLLEGE
2- NEW BODLEIAN LIBRARY
3- OLD CLARENDON
4- SHELDONIAN THEATRE
5- SCIENCE MUSEUM (OLD ASH-MOLEAN)
6- EXETER COLLEGE
7- OXFORD STORY
8- ST. MARY MAGDALENE CHURCH

PARKS ROAD
HOLYWELL STREET
NEW COLLEGE LANE
CATTE STREET
TURL STREET
CORNMARKET STREET

ENLARGED VISIBILITY GRAPH

LARGE GROUPS OF TOURISTS

PEDESTRIANISATION OF BROAD STREET ON THE WEST

GUIDED TOURIST GROUP

Fig. 4.5k- Broad Street: Axial representation, Visibility graph and Images.

LOCAL   TOURIST   STUDENT   TOURIST GROUP   SITTING   GUIDED TOURIST GROUP
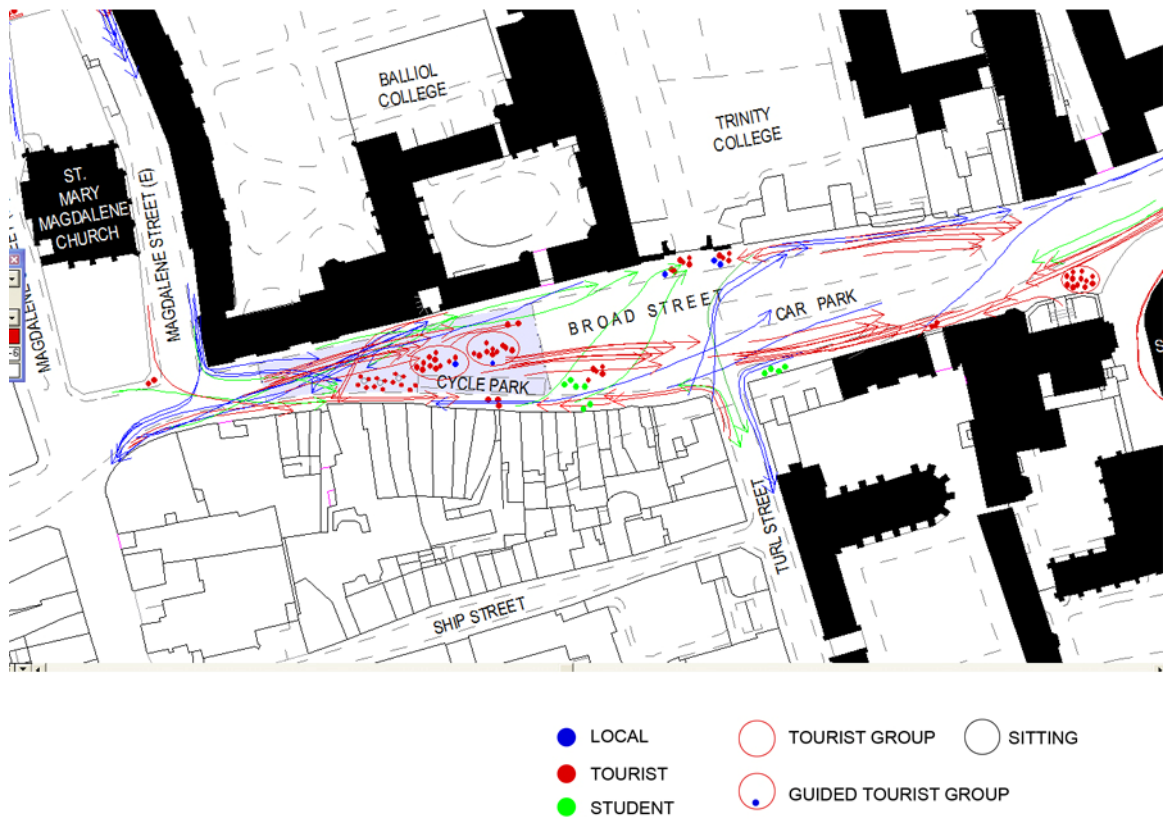
Fig. 4.5l- Broad Street: Static Snapshots (Thursday).

Carfax, Bonne Square, and The Martyr's Memorial at St. Giles

Carfax, [*Fig.4.5m,n*] the junction of High Street, Queen street, Cornmarket Street and St. Aldates houses the Carfax Tower which is a popular tourist attraction in Oxford. The Carfax shows high co-presence of user groups, the local inhabitants who traverse the junction and tourists who throng the junction for views of the Tower, or access streets at the junction. Tourists use the site's street furniture and the recessed corners of the buildings for a halt that makes the Carfax along with the Martyr's Memorial as spots exhibiting significant multi-user co-presence. It is at these junctions that the tourist interfaces with the local activity and the city's historic roots.

Bonne Square, [*Fig.4.5m,o*] on the other hand is dominated by local inhabitants who use the square for a halt as they shop. The square is flanked by busy streets, but it being on raised ground and cornered at the junction makes the square sparingly used. It also lacks the historical features that are seen in most of the other public spaces.

St. Giles Martyr's Memorial [*Fig.4.5m,o*] is also a site of high co-presence as the stepped surface of the memorial offers opportunities to halt for both the local residents and tourists

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especially those in large groups. Guided tour groups also halt at the memorial as events relating to the memorial are narrated. The co presence at the memorial is apparently due to its strategic location, where the tourist to the Ashmolean Museum, the out-of-town shopper and the resident shopper are brought together.
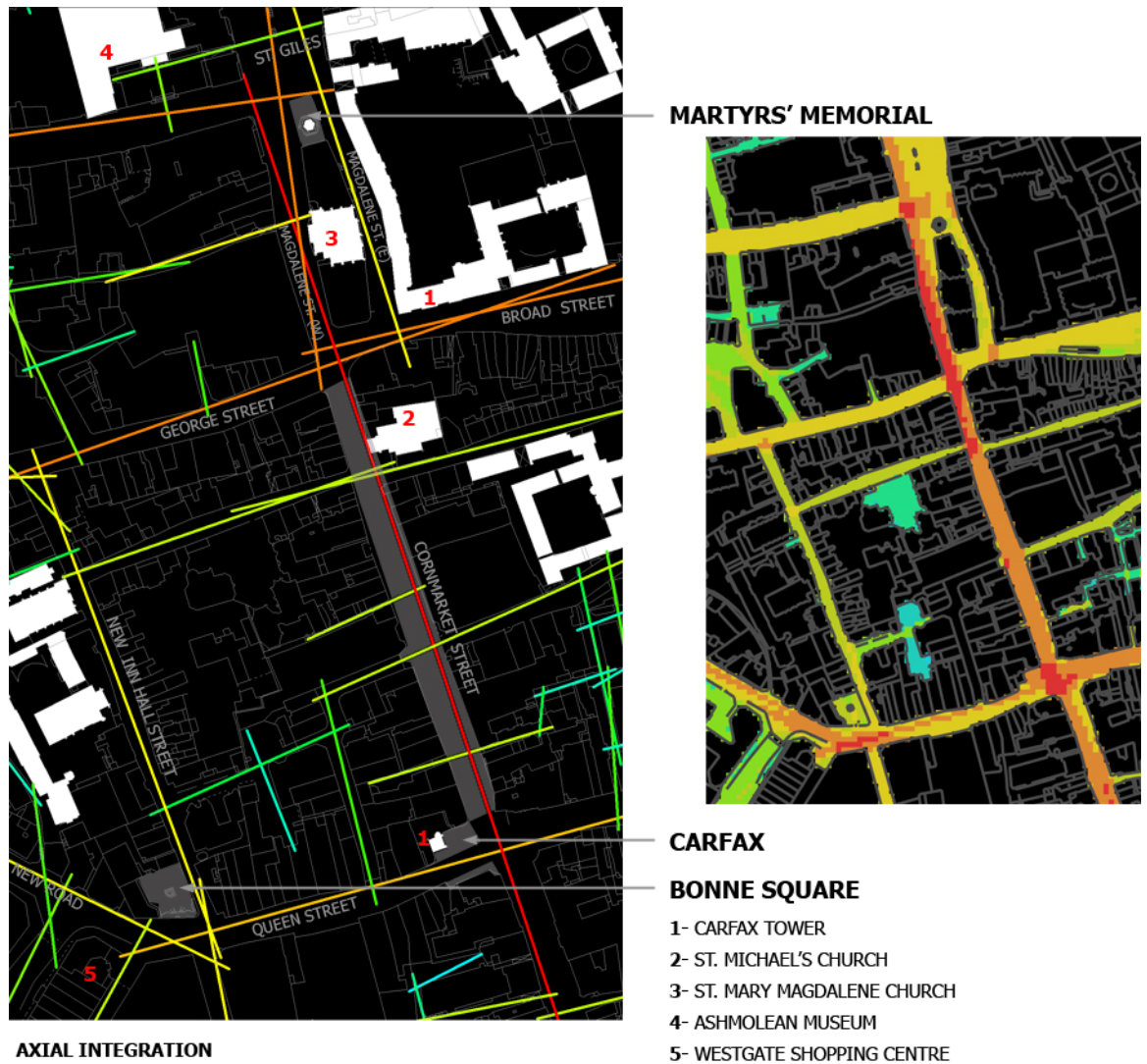
Fig. 4.5m- Bonne Square, Carfax and Martyrs' Memorial: Axial representation and Enlarged Visibility Graph.

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STREET FURNITURE AT CARFAX

CARFAX TOWER

TOURISTS AND STUDENTS AT CARFAX TOWER

PEDESTRIANS AND PERFORMANCES ON CORNMARKET STREET

CARFAX JUNCTION

STATIC SNAPSHOTS AND MOVEMENT TRAILS (THURSDAY)
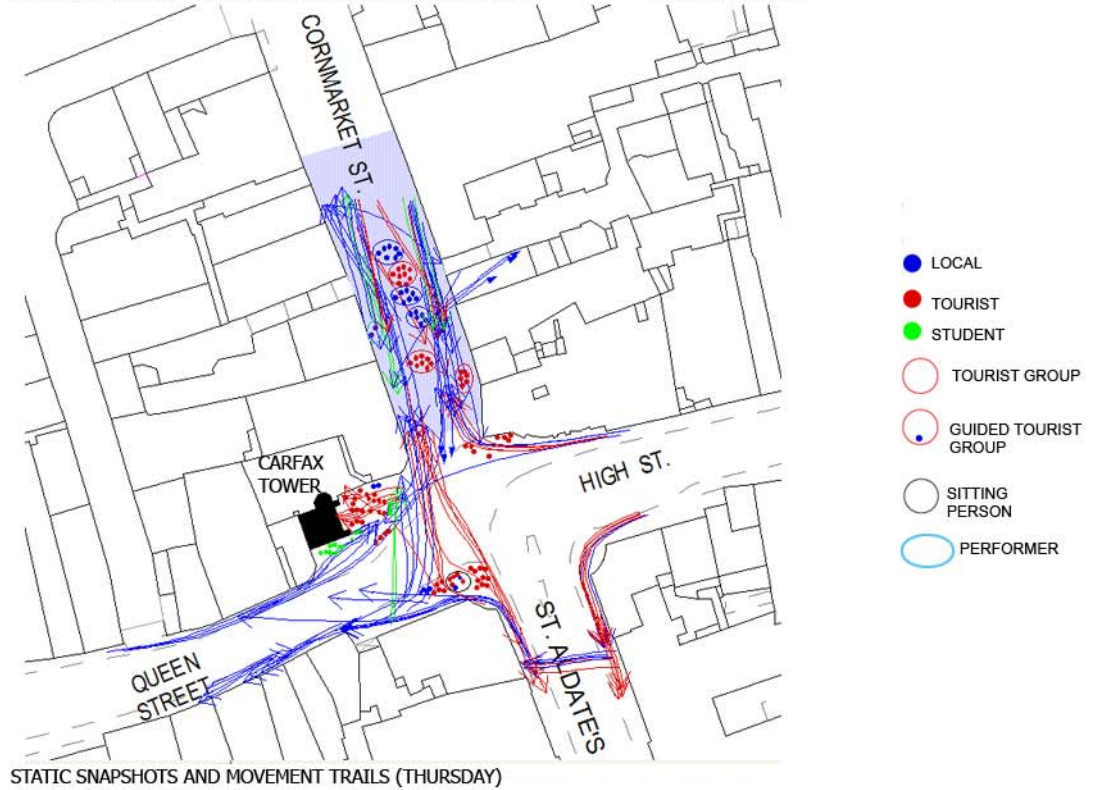
Fig. 4.5n- Carfax: Static Snapshots and Movement Trails (Thursday).

PERFORMERS AT BONNE SQUARE

SHOPPERS- LOCALS AND STUDENTS
AT BONNE SQUARE

GUIDED TOUR GROUPS AT THE MARTYRS'
MEMORIAL

LOCAL SCHOOL GROUPS AT THE MARTYRS'
MEMORIAL

STATIC SNAPSHOTS AND MOVEMENT TRAILS
AT BONNE SQUARE (THURSDAY)
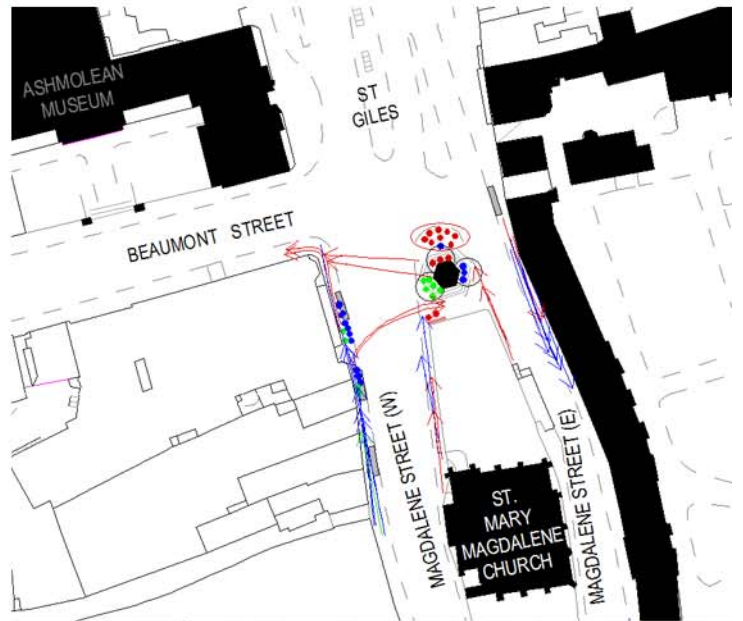
STATIC SNAPSHOTS AND MOVEMENT TRAILS
AT THE MARTYRS' MEMORIAL (THURSDAY)

● LOCAL	◯ TOURIST GROUP	◯ SITTING PERSON
● TOURIST	◉ GUIDED TOURIST GROUP	◯ PERFORMER
● STUDENT		

Fig. 4.5o- Bonne Square and Martyrs' Memorial (below): Static Snapshot and movement Trail (Thursday).

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Gloucester Green [*Fig.4.5p,q*]

Gloucester Green has its origin as the Castle prison and was converted to a public space in 1948 and is used as a farmer's market once a week. The site has direct access from the Bus station, George Street and Magdalene Street but is set out of direct view from the main streets. The site is bordered by shopping and cafeterias but on a daily basis, it shows low usage except by few who access the bus station.

AXAL INTEGRATION

1- WORCESTER COLLEGE
2- NUFFIELD COLLEGE
3- ST MARY MAGDALE CHURCH ON MAGDALENE STREET
4- STUDENT UNION
5- GLOUCESTER GREEN BUS STATION

GLOUCESTER GREEN BUS SATION   GEORGE STREET

CAFETARIA AT GLOUCESTER GREEN

PERFORMANCE FOR CHARITY
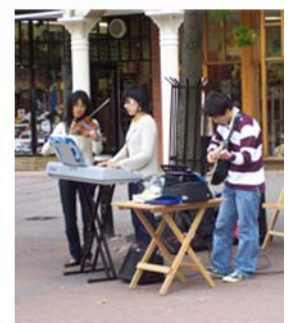
Fig. 4.5p- Gloucester Green: Axial representation, Enlarged Visibility Graph and Images.

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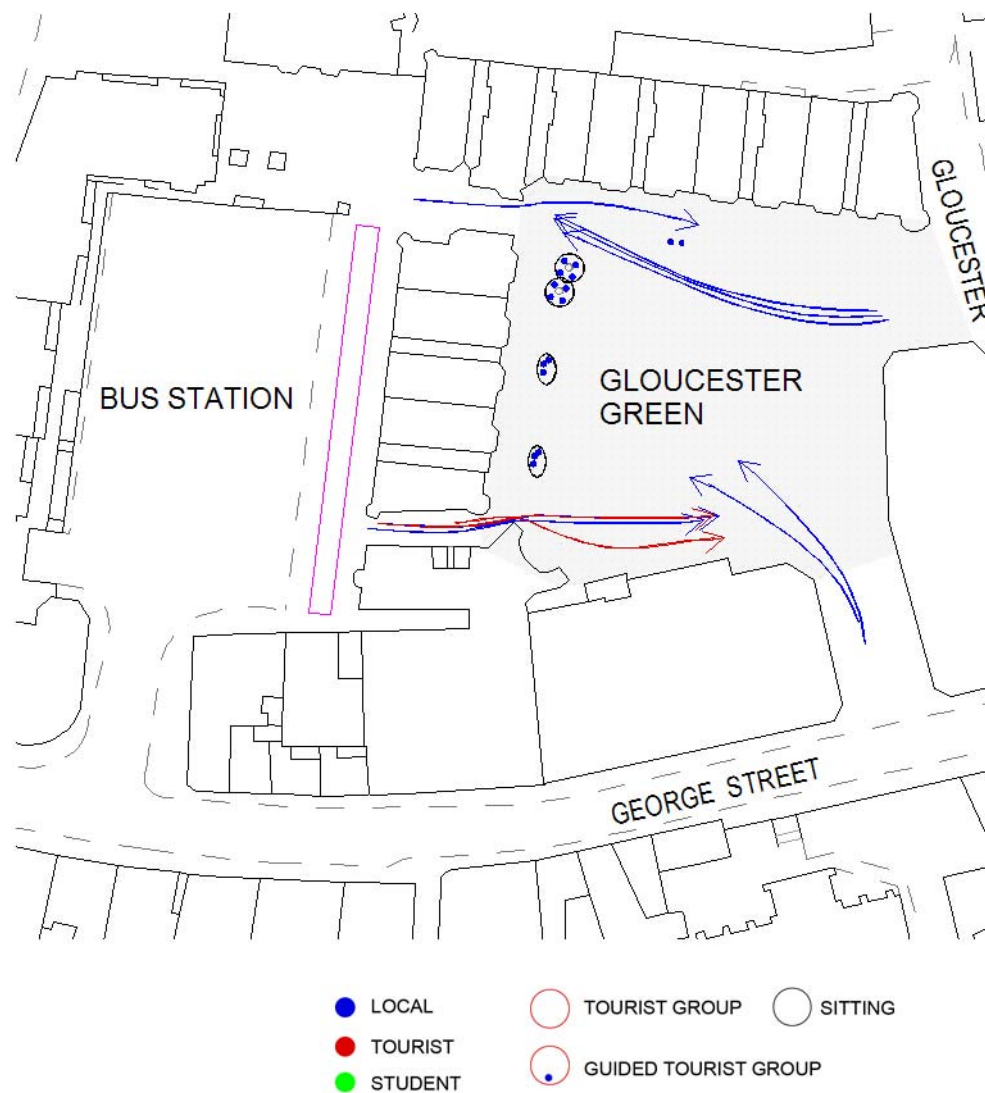
Fig. 4.5q- Gloucester Green: Static Snapshots (Thursday).

Christ Church Meadows [*Fig.4.5r,s*]

Christ Church Meadows attracts large number of tourists as Christ Church College forms the largest and the most significant part of the University. The meadow is shielded from use but the adjacent lawns are used by local families for picnics. Though the site is accessed by all user groups, they are distanced by space and are unaware of other. The tourists access the yard fronting the entrance to the College and proceed further towards the Merton Grove. The students on the other hand occupy the lawns further and the stretches along the river. This scenic riverfront is distanced from Christ Church as the wide avenue leading to it fails to attract the tourist. The Meadow is an example where user groups are distanced by space.

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1- CHRIST CHURCH COLLEGE
2- CORPUS CHRISTI COLLEGE
3- CHRIST CHURCH MEADOW
4- ST. ALDATE'S CHURCH

LOCAL INHABITANTS USING THE LAWN

AXIAL INTEGRATION
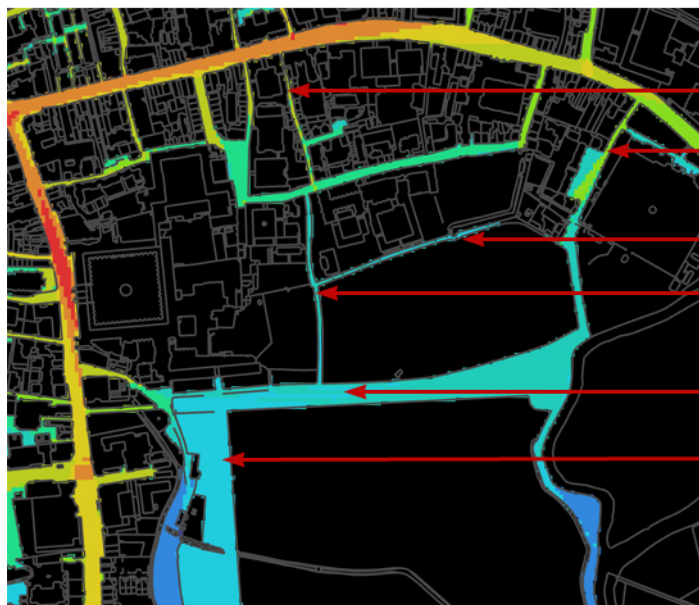
MAGPIE LANE

ROSE LANE

DEAD MAN'S WALK

MERTON GROVE

BROAD WALK

THE NEW WALK TOWARDS BANK
OF RIVER THAMES

ENLARGED VISIBILITY GRAPH

Fig. 4.5r- Christ Church Meadow: Axial representation, Enlarged Visibility Graph and images.

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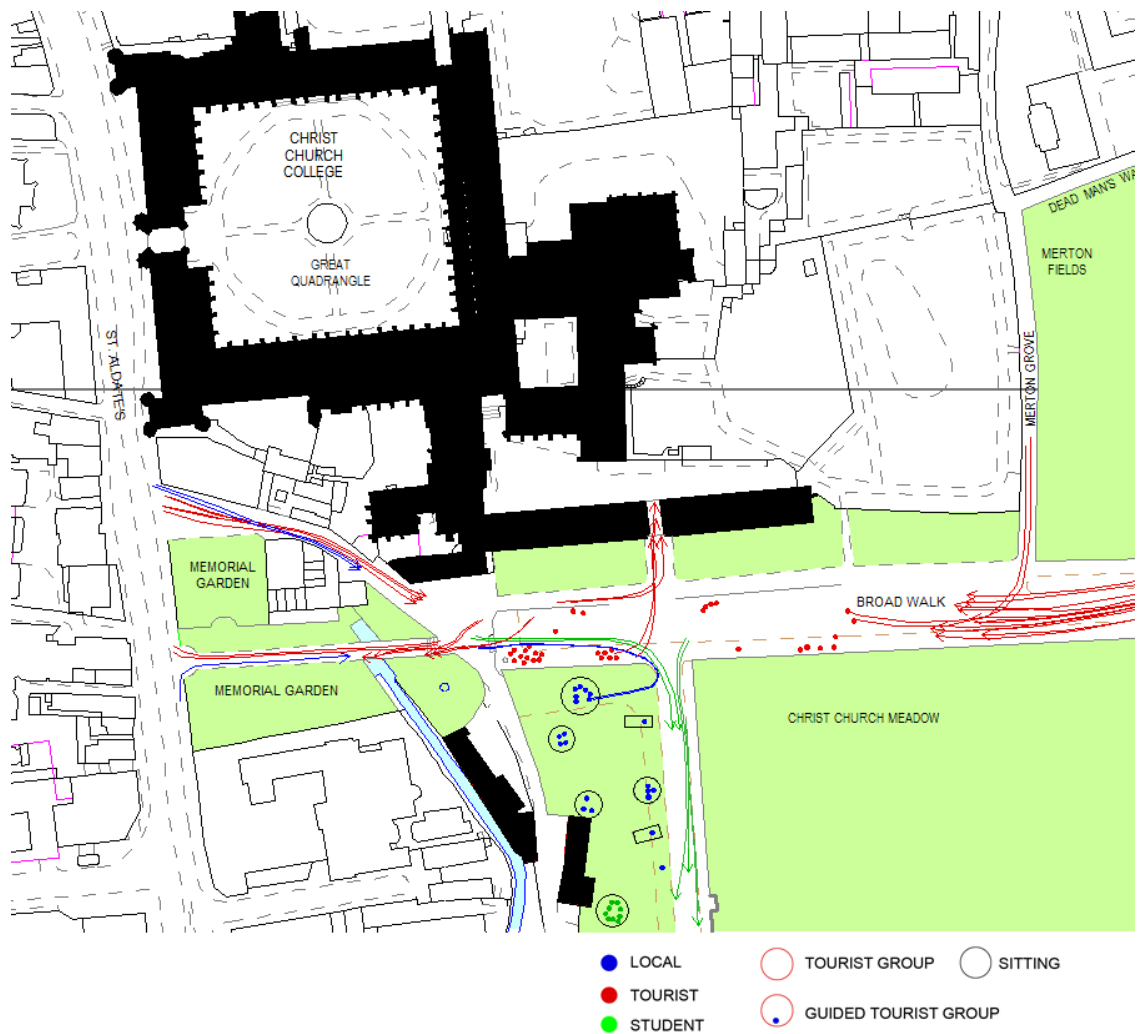
Fig. 4.5s- Christ Church Meadow: Static Snapshots and Movement Trail (Thursday).

<u>Oxford Castle Yard</u> [*Fig.4.5t,u*]

Oxford Castle yard is located on New Road. Oxford Castle was turned into the County Gaol after the castle fortification was lowered and later into a prison in 1888. The New road built in 1771 visually disconnected access to the site as it was functioning as a prison. Oxford Prison was converted to a hotel with catering facilities and guided tour of the Prison cells. However, the public space is visually segregated from tourists who occupy the neighbouring streets and the site's Restaurants are accessed occasionally by Locals. The site is also located on the face of a large impermeable block and its staggered public spaces restrict through-movement. Observation shows that the space functions as a destination leisure spot for mainly Local inhabitants.

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1- CASTLE MOUND PART OF
    PRISON TOUR
2- GEORGE TOWER (CASTLE REMAINS)
3- HM PRISON (PRISON TOUR)
4- HM PRISON NOW MALMAISON
    HOTEL
5- COUNTY HALL
6- RESTAURANTS/CAFES
7- RESTAURANTS/CAFES WITH
    RESIDENTIAL ABOVE
8- WESTGATE SHOPPING CENTRE
9- BONNE SQUARE
10- NUFFIELD COLLEGE
     RESIDENTIAL ABOVE
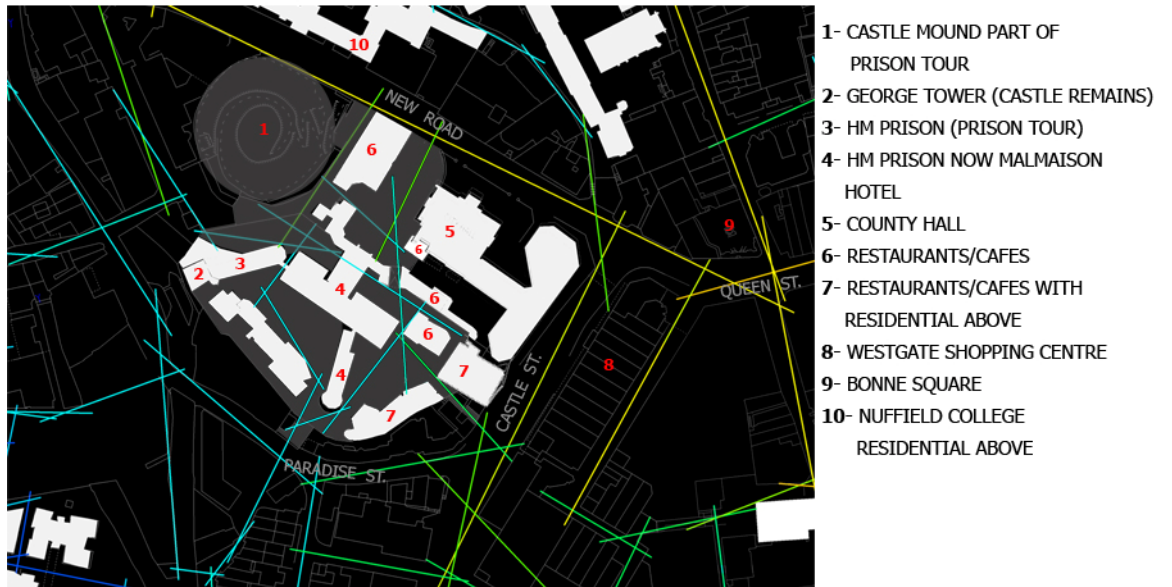
AXIAL INTEGRATION
(CastleYard Plan Source: Oxford Preservation Trust)

LOCAL INHABITANTS DINING AT RESTAURANTS

THE INTERIOR PUBLIC SPACE FOR PLAYS

CASTLE MOUND- PART OF CASTLE TOUR

TOURISTS AT THE OXFORD UNLOCKED TOUR

LOCAL INHABITANTS AT THE CASTLEYARD

Fig. 4.5t- Oxford Castle Yard: Axial representation and images.

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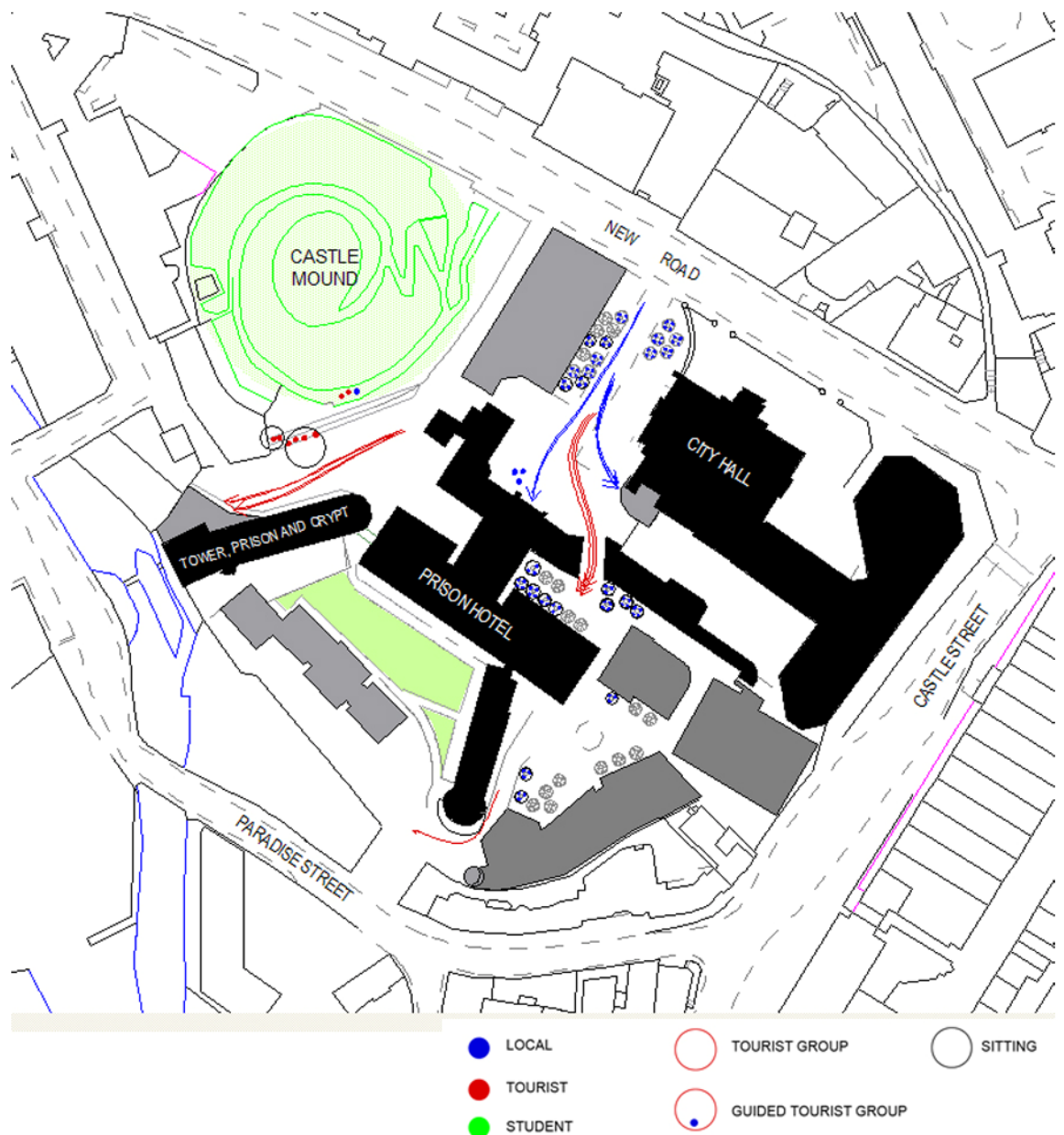
Fig. 4.5u- Oxford Castle Yard: Static Snapshots and Movement Trail (Thursday).

University Museum Lawn [*Fig.4.5v*]

The University Museum lawn on Parks Road, built in the 1800's is distanced from the main site of tourist attractions but its function draws tourists, though in small numbers. The site is often left out of reach of the tourist explorer as Parks Road fails to attract the visitor. On weekdays, the lawn is used by students who study in the Colleges around and Local families with children who visit the museum. During weekends, the site is accessed by the out-of-town school groups who tour the museum.

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AXIAL INTEGRATION

1- RHODES HOUSE
2- KEBLE COLLEGE

UNIVERSITY
AND
PITTS RIVER
MUSEUM

STUDENTS AND LOCAL SCHOOL GROUPS

STUDENTS AND LOCAL SCHOOL GROUPS

LOCAL FAMILIES AT THE MUSEUM

ENLARGED VISIBILITY GRAPH

STATIC SNAPHOTS AND
MOVEMENT TRAILS (THURSDAY)

● LOCAL   ○ TOURIST GROUP   ○ SITTING
● TOURIST
● STUDENT   ○ GUIDED TOURIST GROUP

Fig. 4.5v- University Museum: Axial representation, Enlarged VGA and Static Snapshots.

The public spaces discussed above show varying degrees of co-presence between users. Tourists use public spaces and their facilities that fall on their exploration routes. Streets such as Turl Street, Catte Street and Cornmarket Street to the North of the High Street as well as Rose Lane and Magpie lane to the South, are important components of the routes taken by tourists. These streets show good degree of co-presence between the Tourist and Resident Group as these streets also conform to choice routes taken by inhabitants.

A large number of spaces such as the river front, Magdalene canal canoeing, pubs of historic background tucked away in narrow alleys, which are frequented by Local residents and students of Oxford are rarely accessed by the tourist. With the Tourist, Resident, and the Student finding common space along the city spines, the spaces of recreation preferred by the Local resident are out of view of the exploring tourist.

Chapter 5

CONCLUSION

5.1 Discussion and Conclusion

This thesis set out to provide insights into the relation between the spatial form of the city centre and the co-presence between the Resident and Visitor group. Through a historical review of Oxford, the paper provides a context for understanding the spatial aspects of the socio-economic processes prevalent at the time illustrating the emergent spatial pattern as a contributor to the city's socio-spatial organisation that we witness today. Hillier (2001a) contends that the socio-cultural and the micro-economic processes give form to the urban spatial system. While micro-economic activity mainly affects the emerging global structure of settlements, variable cultures imprint the local texturing of space. The origins of the city plan of Oxford namely the Carfax, the North-South trade route through it and the primacy of the Cornmarket Street shows the city centre's steady role as a Market precinct, which today remains well integrated into the city as a shopping hub. The prevailing social condition of differences between the Town and Gown, vested itself and is visible in the spatial differentiation and the built form of Colleges and their introvert quadrangles. Despite differences, the market later flourished in service to the University acting as a node, investing relations between the town's people and the academia.

- The analysis of the urban framework showed the growth of the city in response to the micro-economic activity at the centre of the University Town, with its deformed wheel pattern linking the local grid of historic space at the centre to the neighbourhoods in the expansion. The deformed wheel pattern and the part-whole relationship of the Heritage core with the rest of the city demonstrate the city's growth in preserving 'life' at the historic centre.

- Through the analysis of urban structure and quantitative analysis of movement patterns of the Resident group of Locals and Students, a higher co-presence is observed in the shopping streets of the centre which conform to choice routes of the local scale network besides streets such as the Cornmarket Street and High Street which are important choice routes at the global scale of the city. The investigation into tourist movement and behaviour at the centre demonstrates the relation between movement and visual fields that are shaped by the built form and street pattern. The analysis suggests that, besides the location of magnets which tourists approach using maps, the movement of exploring tourists is affected by visual fields and the aggregate movement pattern shows that few tourists explore streets that are visually disconnected from the main spaces of circulation. The co-presence in public spaces is varied and while the street junctions or 'squares' conform to higher co-presence, the spaces of recreation such as parks and leisure spaces show

significantly low co-presence of all groups of users. The recreation spaces being away from the buzz of the main streets, they are preferred by the local inhabitants and simply set out of view of the tourist.

Through the analysis of the movement patterns of user-groups, the thesis concludes that the spatial structure impacts the movement of the varied groups which brings the Resident and Tourist group together at the cardinal streets but distances them in the public recreational spaces. The collective co-presence of user-groups on the street structure imprints on the categorization of retail that responds to the degree of co-presence of the respective user-groups.

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ENDNOTES

i | ***Kaffir Kraal*** is a stockade enclosing huts (Dale 1944, p.15).

ii | ***Ford*** here is the 'ford for oxen' known today as the Folly Bridge, a crossing across the Thames on the South, which existed long before the town, obtained any distinct urban identity (Tyack 1998).

iii | ***Carfax*** obtains its name from the Latin term Quadrifurcus meaning 'four forked' (Tyack 1998) followed by the French term Carrefour meaning 'crossroads'. The Carfax tower, seen at The Carfax, is the surviving part of St. Martin's Church, which was demolished in 1896 (Martin and Steel 1954).

iv | ***Foil*** is defined by Sharp (1948 p.44: meaning quoted from the Oxford Dictionary) as 'anything that sets something off by contrast'. He refers to the foils as an essential ingredient of Oxford's urban scenery, without which the City would appear as 'far less Oxford' and 'far less beautiful'. In an architectural sense, he quotes the foils to be as significant, as the buildings they foil.

v | ***Resident* population** is 134,248 (Census 2001-www.statistics.gov.uk) and a ***student population*** of about 30,000 at The Oxford University (www.ox.ac.uk).

vi | A ***Visitor* survey** (Report: Oxford City Destination Benchmarking Visitor Survey 2005) by Tourism South East Research Services on behalf of Oxford City Council gives following statistics for visitor profile:
- Around 57% of visitors are Day visitors, while 43% stay Overnight.
- Of the Day visitors, 58 % are Domestic visitors (22% come from Oxfordshire, 13% from Buckinghamshire, 12% from Greater London, 12% from Berkshire). Around 43% of Day visitors are from overseas staying out of the City.
- Age profile of visitors: 11% of visitors are above age of 65, 38% are aged between 44-64, 27% are aged between 25-44, 16% are aged between 16-34, 15% of visitors are under the age of 15 years.
- Around 89% of groups visiting Oxford contain adults only.
- Overseas visitors comprise 58% of the total visitors to Oxford (mainly from USA, Australia, Germany). Domestic visitors from within the UK comprise 42 % of total visitors.

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APPENDIX-1

App-1.1 - Space Syntax Terminology

The Terminologies put here in this appendix are extracts from publications, which comprehensively discuss Space Syntax Theories and Methodologies.

1 **SPATIAL CONFIGURATION**
"Spatial configuration is the relationship between two spaces that takes into account at least a third or almost all spaces of the system".

Hillier, B., Hanson, J., Graham, H., 1987, Ideas are in Things: An Application of the Space Syntax Method to Discovering House Genotypes, Environment and Planning B: Planning and Design 14, pp 363-385.

2 **THE 'ALL LINE MAP' AND THE AXIAL LINE**
"The 'All line axial map' is a form of spatial representation. This is not all the lines of sight that pass through an environment, as this would be infinite in number. Instead, the all line axial map, consists only of the most *strategic* of these lines: the lines that connect any pair of mutually visible edges plus the extensions of these lines until termination at a surface or boundary. Axial lines are a form of spatial representation defined by a set of rules: The fewest and longest lines of sight that pass through every space in the system and it forms a small sub-set of the 'all line map'".

Conroy Dalton, R., and Bafna, S., 2003, The syntactical image of the city: A reciprocal definition of spatial elements and spatial syntaxes, Proceedings of the 4th International Symposium on Space Syntax, London 2003.

3 **MEASURES OF THE GRAPH 'AXIAL MAP'**
First order measures
"First order measures are direct measures of the system of space, second order measures are relations among these measures. Measures such as 'connectivity' and 'integration' are *first order* measures. Of the first order of measures, the "local state" measure is simple connectivity: how many other lines are only one step away from each line (i.e. immediately connected to it). The "global state measure" is "integration": essentially, how many other lines are up to *n* steps away form each line. The "local dynamic" measure is "control": what degree of choice does each space represent for its immediate neighbours as a space to move to. The "global dynamic" measure is "choice": the degree of choice each space represents (how likely it is to be passed through) on all shortest routes from all spaces to all other spaces in the system" (Hillier et al 1987, p.236-237).
"Thus, the simplest are those that describe the local properties of a node in the graph (that is an axial line): **'connectivity'**, for example, measures how many other nodes are directly accessible from it; **'control value'** measures the degree to which a node 'controls access' to and from its neighbours. The most important global measure is called **'Integration'** which measures the mean depth of every other line in the system from each line in turn, relativised with respect to how deep they could possibly be with that number of lines, then standardized as shown in Hillier and Hanson in The Social Logic of Space. The most integrated lines are those from which all others are shallowest on average, and the most segregated are those from which they are deepest. A key property of interest is how the various configurational variables are distributed in the urban grid. This can be shown graphically by drawing 'core maps' of, for example, the 10% most integrated lines numbered in order of integration and the 50% least integrated (most 'segregated') in a system. In most towns or urban areas, **'integration core'** maps will pick out the main thoroughfares and shopping areas, whereas the least integrating will tend to pick out areas with primarily residential functions" (Hillier et al 1993 p.35).

Hillier, B., Penn, A., Hanson, J., Grajewski, T., Xu, J., 1993, Natural movement: or, configuration and attraction in urban pedestrian movement, Environment and Planning B, 20(1), pp: 29-66.
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4   **INTELLIGIBILITY**
Second Order Measures
A two level model of measurement is part of Space Syntax Analysis, in which "first order" measures are direct measures of the system of space, and "second order" measures are relations among these measures. Measures such as 'connectivity' and 'integration' are *first order* measures. The most important of *second order* measures is **'Intelligibility"** (Hillier et al 1987 p.236-237).

"Intelligibility is the correlation between connectivity and integration and is a fundamental mathematic property. It is the degree of correlation that exists in a system of spaces between how connected each line is to others and how integrated it is into the system as a whole. This measure is known as intelligibility because the number of lines intersecting a line can be directly seen from that line, while the property of integration cannot be see directly since it expresses the depth of a line from every other space n the system, most of which is invisible. Therefore, it expresses the degree to which the local and the visible properties of space are a good guide to the global and merely inferable properties of the system as a whole" (Hillier 1986).

"If locally well-connected lines are also integrating lines, then the correlation will be strong and the system will have "intelligibility". The whole can be read from the parts. Conversely, if well connected lines are not also integrating lines, then the correlation will be poor, and the whole will not be readable from the parts" (Hillier et al 1987, p.237).

Hillier, B., Burdett, R., Peponis, J., Penn, A., 1987, Creating Life: Or, Does Architecture Determine Anything? Arch. & Comport./Arch. Behav., Vol. 3 (3), pp: 233-250.

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APPENDIX-2

App-2.1 - Street Categories: Gates selected for observation at the City Centre

Fig.						
gate	name	shops	colleges	Back alleys	Medieval Plan During 1200	Extension bet. 1450-1750
1	Cornmarket street	●			●	
2	High street	●			●	
3	High street (mid)					
4	High street (right)					
5	Queen street	●			●	
6	George street	●			●	
7	New Inn Hall street	●	●		●	
8	Market street	●			●	
9	Turl street (N)	●	●		●	
10	Broad street (left)	●	●		●	
11	Broad street (right)					
12	St Aldate's (up)	●	●		●	
13	St Aldates (lower)				●	
14	Merton street		●		●	
15	Alfred street				●	
16	King Edward street				●	
17	Oriel street				●	
18	Logic lane		●		●	
19	Magpie lane				●	
20	Rose lane		●		●	
21	St Michael's street				●	
22	Turl street (S)				●	
23	Blueboar lane				●	
24	New college lane at Bridge of Sighs		●		●	
25	Brasenose Lane			●	●	
26	St. Mary's passage				●	
27	Ship street				●	
28	Queen's lane				●	
29	Catte street				●	
30	New Road				●	
31	Magdalene street(W)	●			●	
32	Magdalene street (E)		●		●	
33	Bodleian library into Radcliffe square		●		●	
34	Sheldonian theatre		●		●	
35	Castle street					
36	Parks road (lower)					●
37	St giles (upper-left)					●
34	St giles (upper-right)		●			●
37	Beaumont street					●

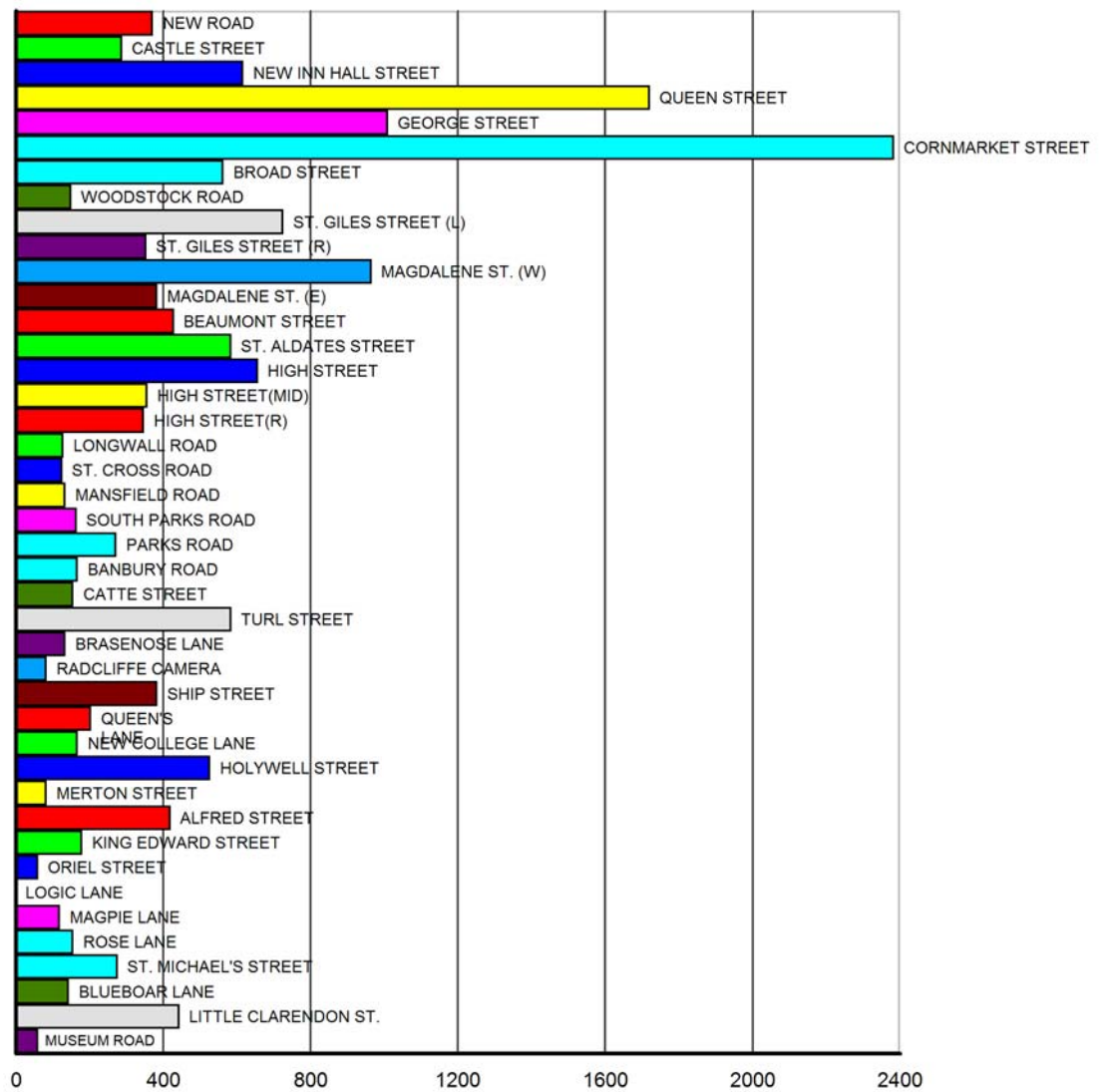| No	Name					
38	Long wall road					•
39	Holywell street (right)		•			•
40	Holywell (left)	•				•
43	St cross road			•		
44	Museum road		•			
45	Woodstock road (lower)	•				
46	Little Clarendon street	•				
47	Woodstock road (upper)	•				
48	Mansfield road		•			
49	South parks road		•			
50	Parks road-Museum					
51	Parks road (at University Park)					
52	Banbury road					
53	Museum road			•		
54	Gloucester Green	• S				
55	Gloucester green	• S				
56	Worcester road (lower)		•			
57	Worcester road (upper)		•			
58	Hythe Bridge	• S				
59	Hythe Bridge left	• S				
60	Parks end road	• S				

App-2.2- Spatial Parameters for gates selected for observation-Analysis on axial map of Greater Oxford

name	Conn.	Int. [HH]	Int. R3	Int. R5 (Rad-Rad)	Line Length
Gloucester Green	3	0.8738661	1.826033	1.640888	86.85158
Gloucester Green	2	0.884724	1.897539	1.739721	53.88927
Worcester road	9	0.9863178	3.112423	2.300659	277.0072
Worcester road lower	9	0.9863178	3.112423	2.300659	277.0072
Hythe bridge	11	0.9746639	2.934687	2.16155	320.0766
Hythe bridge left	16	0.9102545	3.242947	2.206435	626.1372
Parks end	26	0.9392756	3.649786	2.386333	1036.704
New road	10	0.9769071	3.214082	2.286142	361.8974
Castle street	8	0.8906356	2.540398	2.00257	219.1732
New Inn Hall street	8	0.9784375	2.882217	2.091522	261.6779
Queen street	17	1.046623	3.278875	2.279296	575.9612
George street	9	1.032216	3.03544	2.190926	323.4688
Cornmarket	16	1.085822	3.357208	2.327803	638.8073
Market street	8	0.9762526	2.57737	1.935155	257.4699
Parks road (lower)	12	0.9844965	2.932915	2.069496	669.8713
Turl street (N)	6	0.9460233	2.339867	1.852258	218.2614
Brasenose Lane	3	0.9127058	2.034991	1.700149	139.6162
Broad street (left)	9	1.032216	3.03544	2.190926	323.4688
Broad street (right)	6	0.9263985	2.428214	1.895545	217.8417
Woodstock road (lower)	14	0.9602355	3.059075	2.099705	1220.507
Woodstock road	15	0.9680385	3.230347	2.204564	750.1097

|					
(upper)					
St giles (upper-left)	16	1.079201	3.145586	2.245406	776.922
St giles (upper-right)	14	1.069172	3.215581	2.236693	920.5636
Magdalene street(W)	16	1.079201	3.145586	2.245406	776.922
Magdalene street (E)	13	1.002856	2.965683	2.135939	622.8153
Beaumont street	7	1.044098	3.009449	2.252084	303.0546
St Aldate's (up)	16	1.085822	3.357208	2.327803	638.8073
St aldates (lower)	19	1.059739	3.441274	2.372553	896.3324
High street	17	1.046623	3.278875	2.279296	575.9612
High street (mid)	6	1.009386	2.638854	2.045491	316.0587
High street (right)	8	0.9998518	2.806354	2.022918	545.8192
Long wall road	3	0.95495	2.125464	1.839716	241.2424
Holywell street (right)	6	0.8360812	2.100094	1.532507	256.5409
St cross road	4	0.8686228	1.932186	1.558707	276.2595
Mansfield road	4	0.8305222	2.086105	1.604407	230.2275
South parks	10	0.8971788	2.780697	1.880085	480.6206
Parks road-Museum	12	0.9844965	2.932915	2.069496	669.8713
Parks road (at University Park)	9	0.9749029	2.844939	2.073524	529.7867
Banbury road	14	1.069172	3.215581	2.236693	920.5636
Catte street	6	0.9747073	2.631894	2.008023	246.4566
St. Mary's passage	5	0.9439195	2.394575	1.871552	205.1087
Ship street	3	0.9757951	2.279362	1.90397	227.9826
Queen's lane	2	0.9132969	1.627682	1.639921	122.706
New college lane at Bridge of sighs	4	0.916475	2.175034	1.791317	85.77589
Holywell (left)	5	0.905466	2.292821	1.760604	218.2995
Merton street	2	0.9138123	1.835188	1.664829	112.3127
Alfred street	4	0.9436954	2.262725	1.855618	94.78822
King Edward street	4	0.9439399	2.343591	1.873014	170.3913
Oriel street	5	0.9439195	2.394575	1.871552	205.1087
Logic lane	4	0.9443885	2.372751	1.884604	175.5735
Magpie lane	4	0.9133732	1.810426	1.648192	96.57342
Rose lane	3	0.9163405	1.928327	1.675862	191.1127
St Michael's street	3	0.9781529	2.37364	1.950579	169.709
Turl street (down)	3	0.9451235	2.317331	1.871756	126.1175
Blueboar lane	2	0.9753814	2.226766	1.890506	115.5814
Little Clarendon street	5	0.9371012	2.652848	2.013567	254.0722
Museum road	3	0.8950115	2.066674	1.744829	197.9714
Sheldonian theatre	4	0.9235998	2.038651	1.767779	74.18616
Bodleian library into Radcliffe square	2	0.8366732	1.438096	1.430979	91.52152
New College lane into Bodleian library	5	0.9164557	2.190236	1.789554	90.52821

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APPENDIX-3

App-3.1 – Bar Graph showing Street Occupancy by Local Inhabitants.

A horizontal bar graph with the following streets listed (top to bottom): NEW ROAD, CASTLE STREET, NEW INN HALL STREET, QUEEN STREET, GEORGE STREET, CORNMARKET STREET, BROAD STREET, WOODSTOCK ROAD, ST. GILES STREET (L), ST. GILES STREET (R), MAGDALENE ST. (W), MAGDALENE ST. (E), BEAUMONT STREET, ST. ALDATES STREET, HIGH STREET, HIGH STREET (MID), HIGH STREET (R), LONGWALL ROAD, ST. CROSS ROAD, MANSFIELD ROAD, SOUTH PARKS ROAD, PARKS ROAD, BANBURY ROAD, CATTE STREET, TURL STREET, BRASENOSE LANE, RADCLIFFE CAMERA, SHIP STREET, QUEEN'S LANE, NEW COLLEGE LANE, HOLYWELL STREET, MERTON STREET, ALFRED STREET, KING EDWARD STREET, ORIEL STREET, LOGIC LANE, MAGPIE LANE, ROSE LANE, ST. MICHAEL'S STREET, BLUEBOAR LANE, LITTLE CLARENDON ST., MUSEUM ROAD.

X-axis: 0, 400, 800, 1200, 1600, 2000, 2400

LOCALS PER HOUR

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App-3.2 – Bar Graph showing Street Occupancy by University Students.
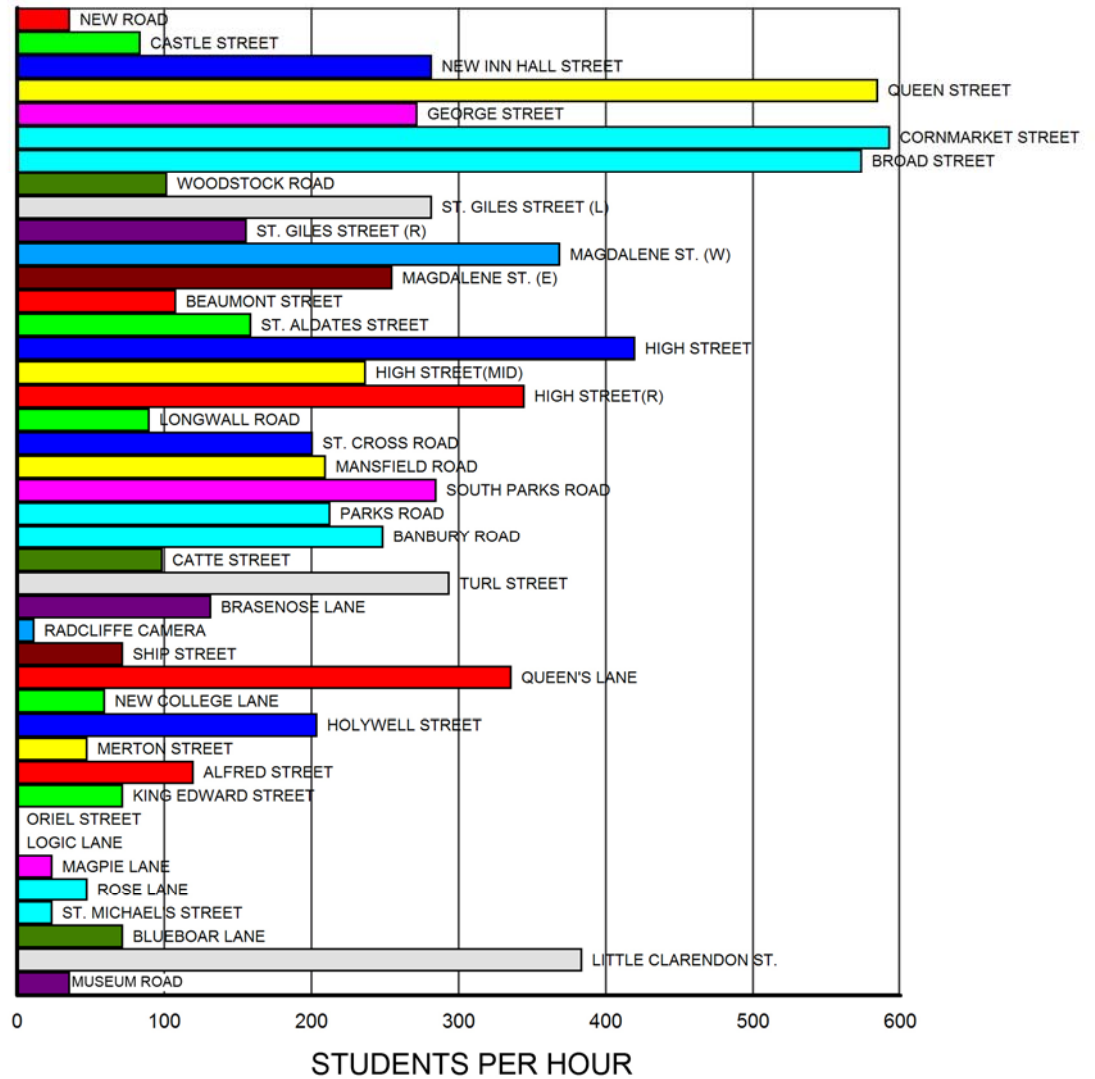
App-3.3 – Bar Graph showing Street Occupancy by Tourists.

TOURISTS PER HOUR