SELFRIDGES DEPARTMENT STORE

BIRMINGHAM, UK

1. Project Basics

Location: Birmingham, UK

Latitude/Longitude: 52°28'38"N, 1°53'38"W

Building Type: Retail

Completion: Sep 2003

Client: Selfridges Department Store

Design Team: Future Systems, Faithful + Gould, and Arup

<http://mishuna.image.pbase.com/u41/fgianni/upload/26617970.SelfridgesByNight.jpg>

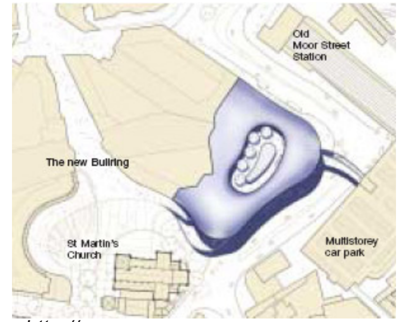
2. Background and Context

In 1858, a baby boy by the name of Henry Gordon Selfridge was born in Wisconsin, USA. He quickly rose through the ranks of the department store world by applying radical ideas, such as annual sales and the bargain basement. By 1909, Gordon had moved to London, UK, and decided to open his own business, Selfridges Department Store. The first store was located on Oxford Street in London and was designed by Daniel Burnham. This state-of-the-art department store applied high design and advanced architecture into its image. This dedication to detail put Selfridges and Oxford Street on the retail map. Unfortunately, in 1947 Gordon Selfridge passed on in his sleep leaving his company to be exchanged many times in the decades to come.

In the 1990s a revolution for Selfridges had began. Vittorio Radice was appointed as Chief Executive in 1996 and pushed to effect a master plan that would totally change Selfridges image. During this time, a radical document known as PPG6 was issued by the national government's department of planning which restricted the construction of out-of-town shopping centers. This ordinance led to the fourth Selfridges store which was to be located in a new urban retail development known as Bullring in Birmingham.

The idea was to push the boundaries of retail innovation and work with modern designers and architects to create exciting state-of-the-art retail spaces.

"Future Systems's vision was a building form that would fit the contextually diverse site whilst embracing Selfridges's demand for an accentuation of the building curvature." Arup provided full multidisciplinary engineering design: structure, services, façades, fire, communications, and acoustics with specialist input from Arup Research + Design.



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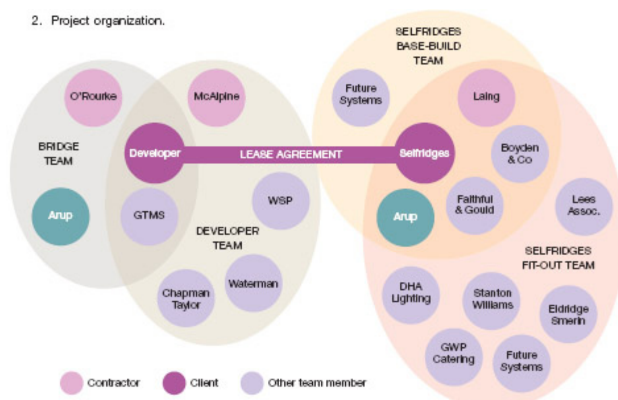

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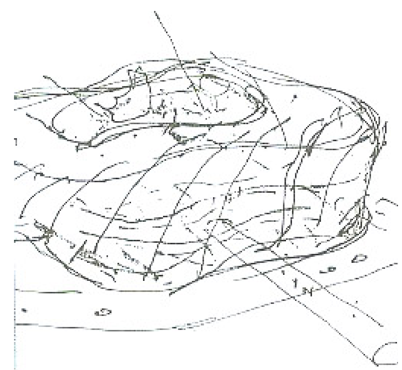

Rowan Moore

3. Design Intent and Validation

When building a structure of this complexity and shape, cost is a definite concern. Combining high architectural aspirations, complex brief, and demanding budget, the project was destined to be an engineering and design management challenge from the outset. Since the building is an organic shape, everything from the structure to the skin had to be rethought. The solution was simple and just as cost-effective as a conventional square building. First, Arup began by laying out the internal steel grid which consisted of strategically placed columns that would not affect the architectural integrity. In order for the buildings systems to be efficiently integrated, the floor-to-ceiling height was set at 1.5m for primary systems, and secondary ducts and pipe work were not located in any specific arrangement to maximize flexibility for future rearrangements. Also, the use

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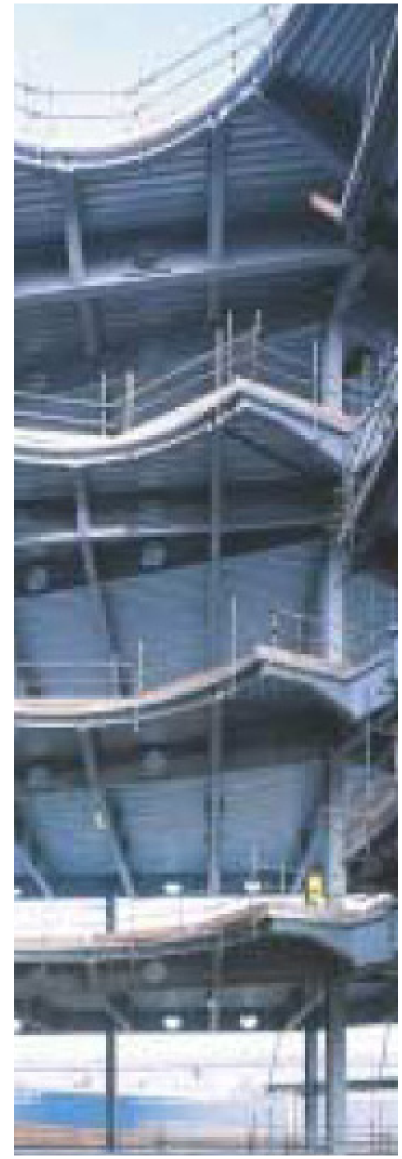

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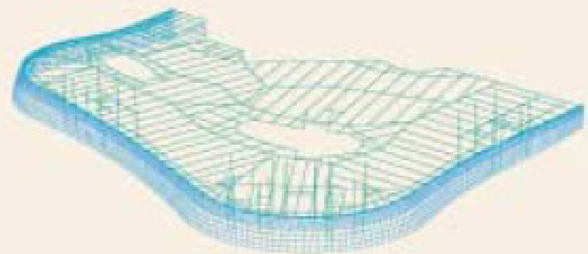
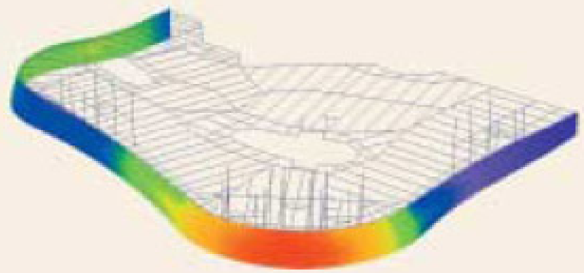
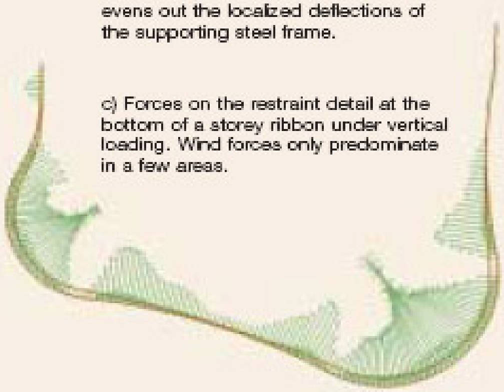


a) Combined floor frame/façade model used to study the composite behaviour of the system.



b) Façade displacements around a typical storey ribbon under full loading, showing the extent to which the façade evens out the localized deflections of the supporting steel frame.



c) Forces on the restraint detail at the bottom of a storey ribbon under vertical loading. Wind forces only predominate in a few areas.

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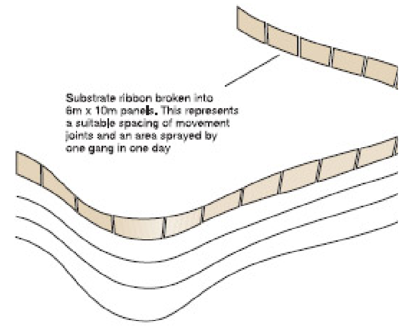
of plate girders allowed greater control over the distribution of material which resulted in much lighter beams and less fabrication waste.

The need to form the curved geometry of the façade without incurring high construction costs presented one of the most complex design challenges. The solution was simple—sprayed concrete. Using an expanded metal mesh as a permanent formwork, sprayed concrete could be formed to the required geometry and sprayed to the appropriate thickness to hold its own shape and could resist wind loads without the need for support sub-framing. To avoid likely problems from the overall weight of the concrete, such as buckling and increased loads on ground-level windows, the weight was divided per level. This was accomplished by introducing substrate ribbons that would carry the loads per floor. The careful design was tested and retested to ensure safe horizontal and vertical loads in Arup's in-house software, RC2D.

The façade of this building is very recognizable and unique: it has been said, "The building is a romantic metaphor machine, stimulating its creators and critics to call it a dress, a diamante bustier, a boulder, a sea monster, an alien, a cloud, even an insect's eye" (*Metropolis* 125). These type of responses to the building may have something to do with its 15,000 aluminum discs and Yves Klein blue background. Amazingly, the final design is comparable, on cost terms, with the more traditional metal and glass façades of the adjacent buildings.



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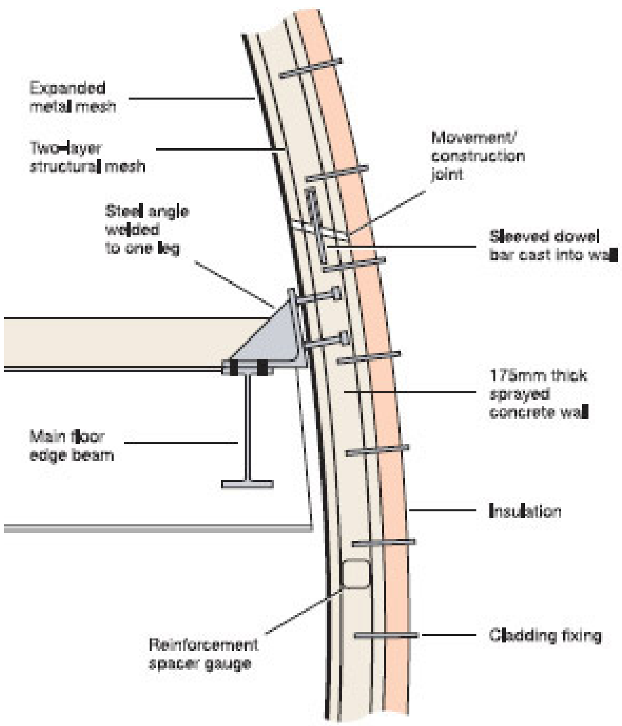
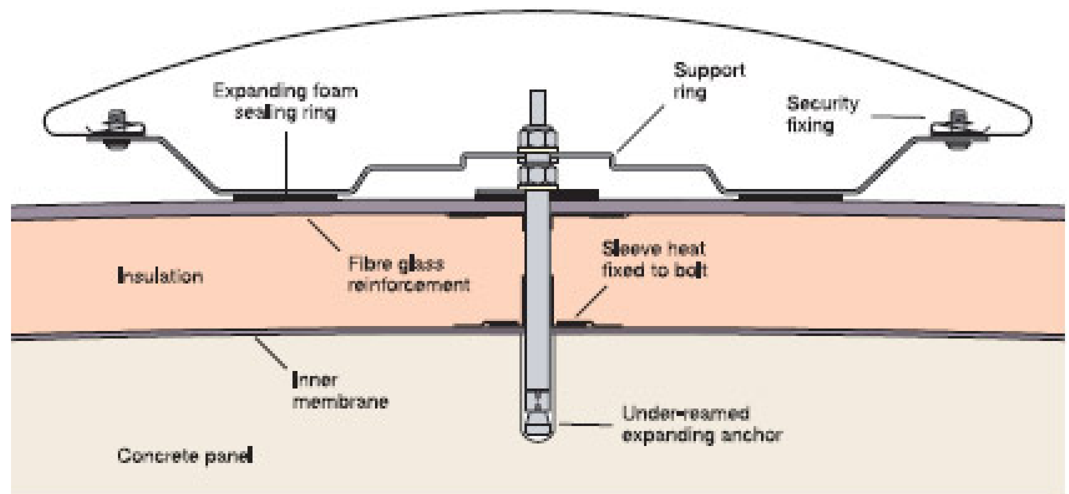
Rainwater from the curved roof and façade is collected by integrated, "invisible" gutters at the façade "shoulder" level, where it is brought into the building and connected to down pipes in the cores. Unfortunately, the building does not use any water strategies or treatments.



Indicative section through sprayed concrete wall, showing fixing detail.



Indicative detail of façade construction and fixing.

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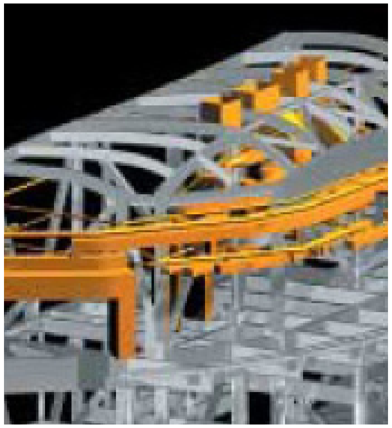
4. Key Design Strategies

Though the budget was one major issue in this endeavor, there were three main principles that governed the design of the building: Comfortable internal conditions, flexibility to accommodate future change, and energy efficiency.



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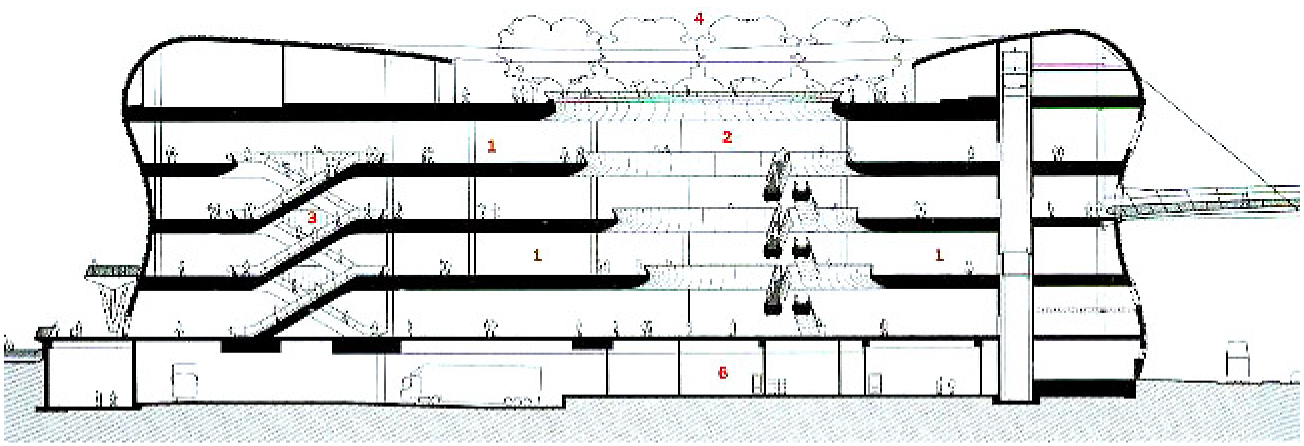
A substantial amount, around 15%, of turn around is expected due to changing fashion and retail. For this reason, the design team developed a “plug-and-play” system of retail services, with power, air-conditioning, data cabling, lighting control, and building management system (BMS) all available locally in retail areas without the need to access perimeter risers. This allows for all controls to be central and then reprogrammed accordingly.

Another aspect that was taken into careful consideration was the amount of daylight that was allowed in the space. The traditional arrangement in a department store is to keep a minimal amount of windows and penetrating daylight into the space. This, however, was not your typical box department store and called for a detailed computer model to precisely calculate the size of the skylight opening in the atrium to maximize the natural light.

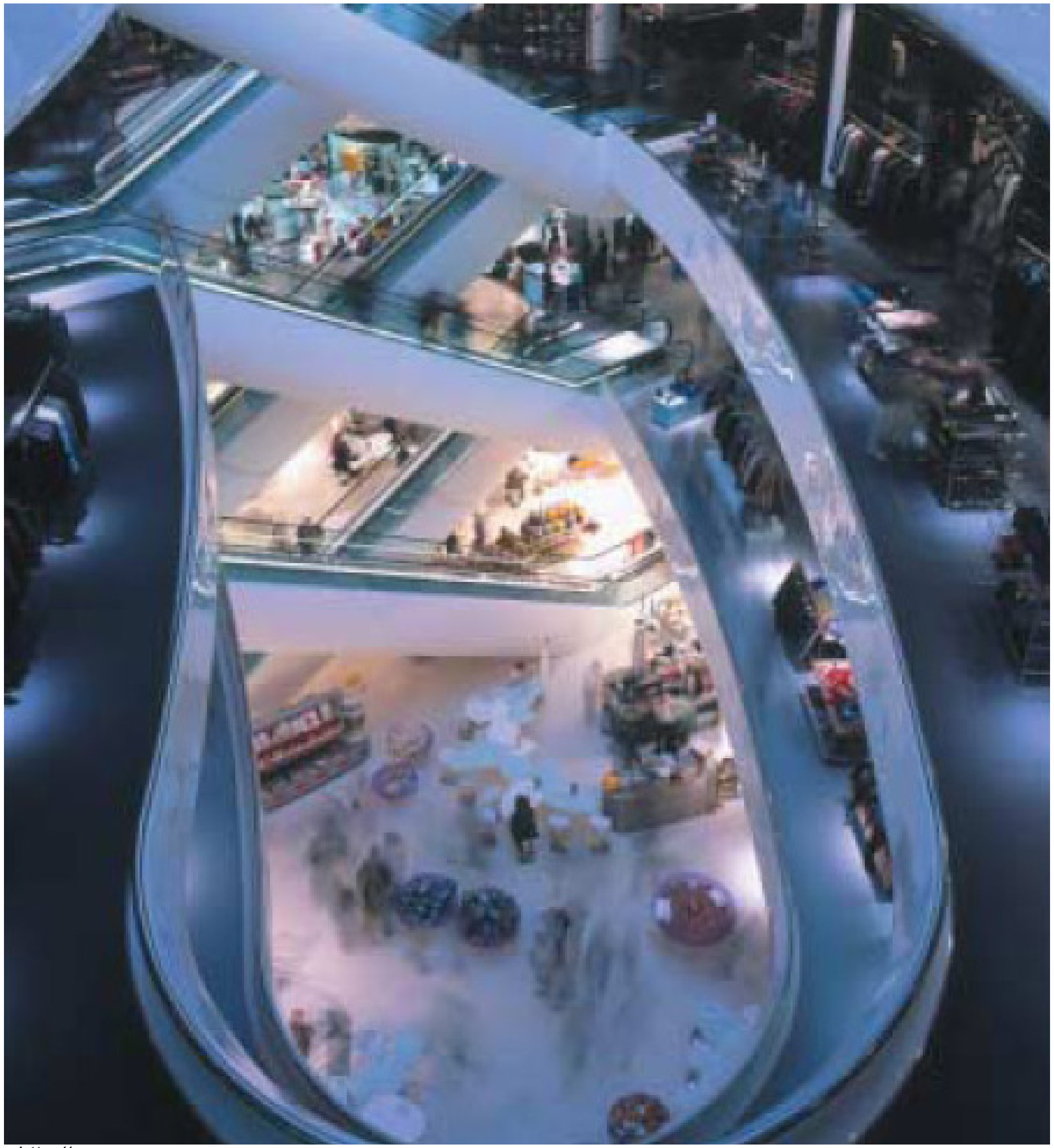
The mechanical services in a retail building, such as Selfridges, must endure a variety of different energy loads. High amounts of lighting and always changing occupancy loads must be accounted for in the most delicate way. Systems were therefore developed that took advantage of the varying loads to provide calculated



James S. Russell

annual energy savings of over 40%, compared with the standard constant volume retail air system with fixed fresh air percentages and fixed-speed chilled water system. A variable air volume (VAV) system was selected instead of a constant column system to give savings in fan energy at non-peak loads and avoid chilled water on floor plates. All of the VAV systems including the eight small air-handling units on the roof are all controlled by local temperature sensors.

Power for a store of this size is also a major factor in the design. By splitting the power supply from two independent HV rings allows for constant and backup power without the need for a costly onsite generator. The buildings lighting is also split into three separate control systems: security lighting, general/cleaning lighting, and display lighting which is only on when the store is open. These three systems allow for optimal lighting for the correct condition resulting in minimal energy waste.



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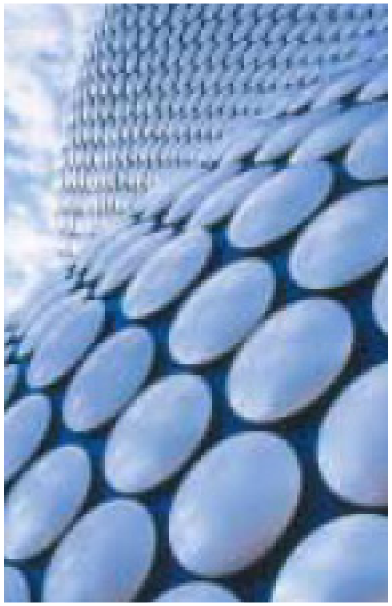
5. Performance Studies

Unfortunately, there have been no published performance studies of the building post-occupancy. However, the design team did do a pretty extensive job using all their resources. Arup Research + Development played a massive role in testing and analyzing such elements as: structure, services, façades, fire, communications, and acoustics. The use of in-house software and 3D computer modeling allowed for an efficient and economical building.

The Selfridges building has also achieved many outstanding and innovative awards such as: Concrete Society Outstanding Structure Award, Institution of Civil Engineers Regional Award, Royal Fine Art Commission & BSkyB Retail Innovation Award, Royal Institute of British Architects Regional Award, and Structural Steel Design Award.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6. Further Information

The Arup Journal (1/2005 edition) has an excellent behind-the-scenes look at the overall construction of the building. It goes into great detail about various elements of the building, not to mention the excellent graphics.

7. References

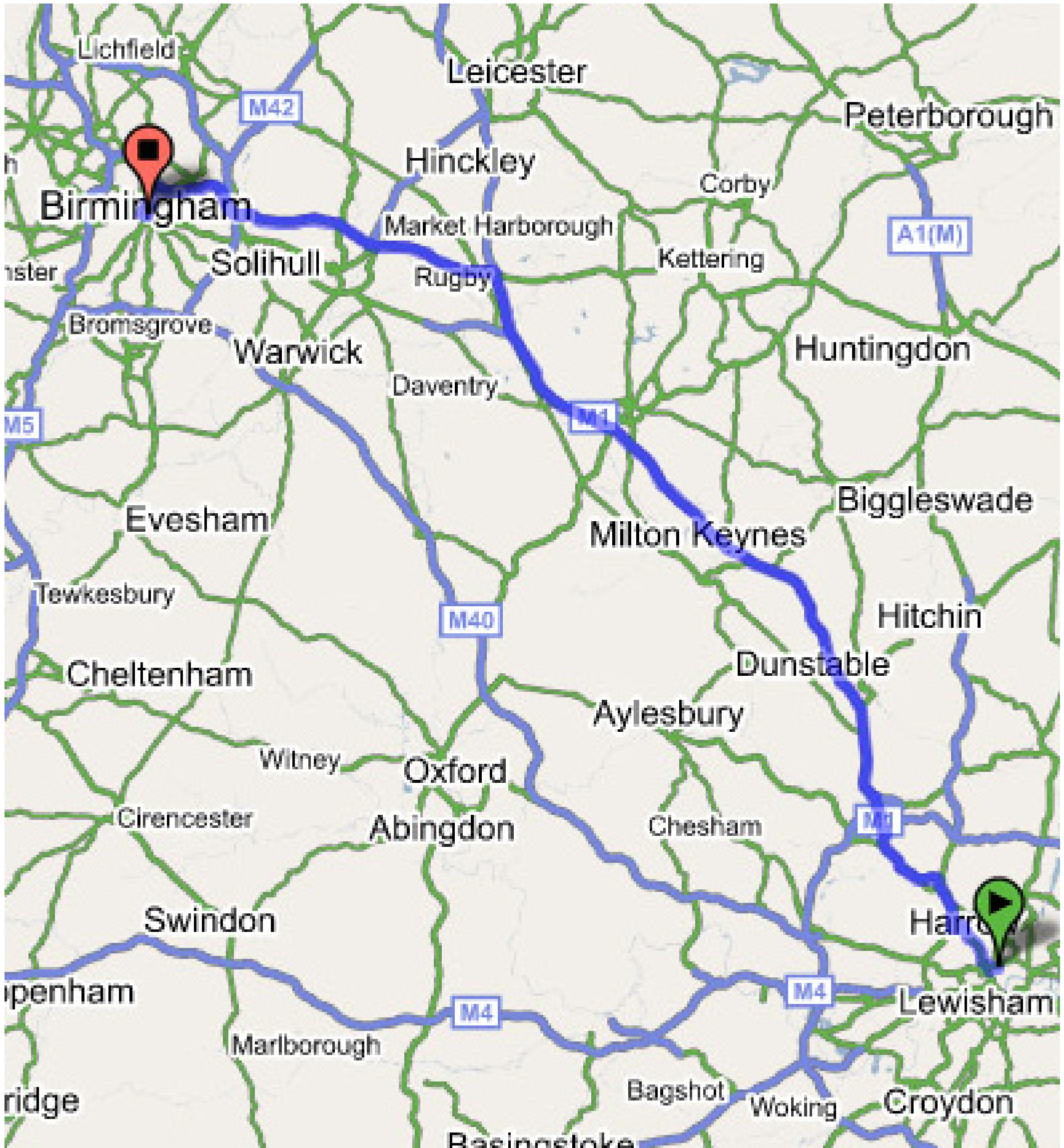
Moore, Rowan. “Spaceship Selfridges.” *Metropolis* Mar (2004): 81–87.

Russell, James S. “Selfridges Department Store, Birmingham, U.K.” *Architectural Record* Jun (2004): 234–241.

<http://mishuna.image.pbase.com/u41/fgianni/upload/26617970.SelfridgesByNight.jpg>

<http://www.arup.com>

8. Map and Transport



<http://www.Google.com>

Your journey details

Outward journey: Tuesday 28 March 2006

Station	Arr	Dep	Travel by	Service Provider
LONDON MARYLEBONE		09:20	Train	CHILTERN RAILWAY CO
BIRMINGHAM SNOW HILL	11:42			

Send me this by SMS

Return journey: Wednesday 29 March 2006

Station	Arr	Dep	Travel by	Service Provider
BIRMINGHAM SNOW HILL		09:52	Train	CHILTERN RAILWAY CO
LONDON MARYLEBONE	12:00			

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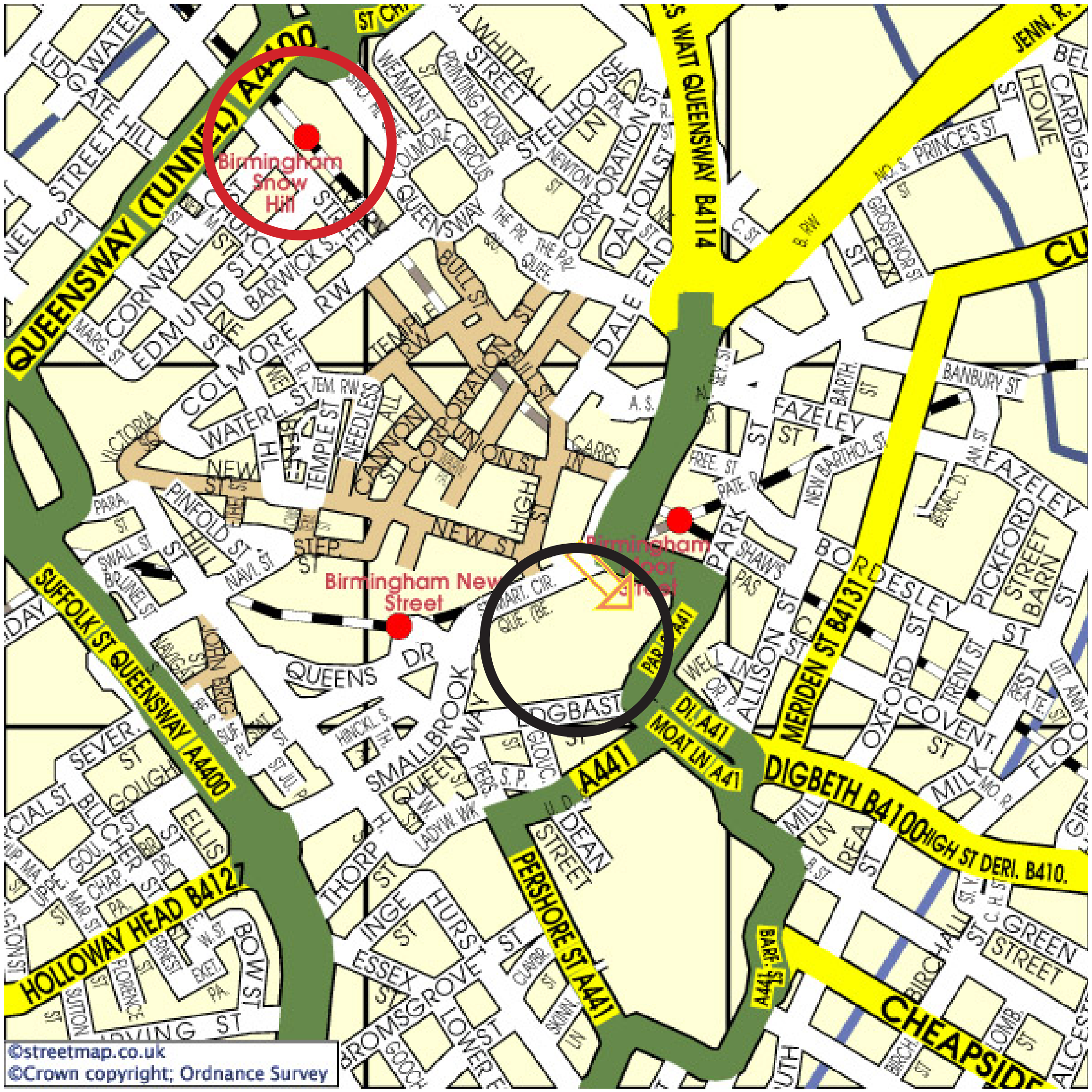

Case Study by Troy Charlesworth, Spring 2006