Inland Revenue Centre

Photo: Hopkins and Partners

A Green Campus in Nottingham by Hopkins and Partners

Inland Revenue Centre Campus

Location: Castle Meadow, Nottingham, UK

Latitude/Longitude: 52°58N/1°09W

Building Type: Typically Concrete and Masonry (w/ steel and glazing)

Square Footage: Approximately 120,000 sf; typically 3 stories

Completion Date: Sep 1994

Client: Inland Revenue (UK)

Architect: Michael Hopkins and Partners

Engineering: Ove Arup and Partners

Overview

The IRC in Nottingham is a complex designed for 1,800 staff offices along with amenities. It is comprised of seven separate buildings that create tree-lined boulevards with sports and recreational facilities, a creche, and staff restaurant. All buildings are naturally ventilated using both thermal mass and thermal towers.

Goal: Maximize energy efficiency while providing complete services for staff and setting standards.

Context

A former goods yard, the site is bounded by a canal to the north and by railway lines to the south, with Nottingham Castle towering above. The project extends the urban grain, density, and character of the city across the canal. The castle on its steep bluff is the focal point of the radiating streets which cross a curving east–west spine road.

Awards

1995 Brick Award for the Best Commercial and Industrial Building

1995 International Prize for Textile Architecture

1996 Concrete Society Certificate of Excellence Outstanding Structures

1996 Highly Commended Green Building of Year Award

1997 Civic Trust Energy Conservation Award

1999 IOCFIAKS Award for Exemplary Sports and Leisure Facilities Silver Award

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Green Strategies

"The main strategies are the maximization of daylight and engineered natural ventilation."

Thermal Towers

1. Fresh air is drawn through underfloor duct and grill which can be mechanically induced.

2. Cross-ventilation in office area (from open windows).

3. Warm air exhaust through the door, connected to the stair tower. Solar gain in the tower increases thermal buoyancy; warm air is drawn up through the tower by stack effect.

4. Operable tower roof moves up and down to control the rate of air flow.

5. On the top floor, warm air is exhausted at the roof ridge.

Façade Strategies

1. Integrated lightshelf shades space in the perimeter zone and reflects light into the space.

2. Light-colored ceiling improves reflectance of daylight. High ceiling (3.2 m) helps thermal stratification. Exposed concrete soffit acts as thermal mass, absorbing daytime heat gain.

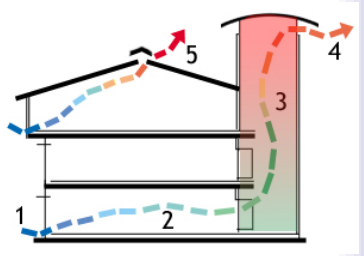


Photo: High Performance Buildings

Photo: Hopkins and Partners

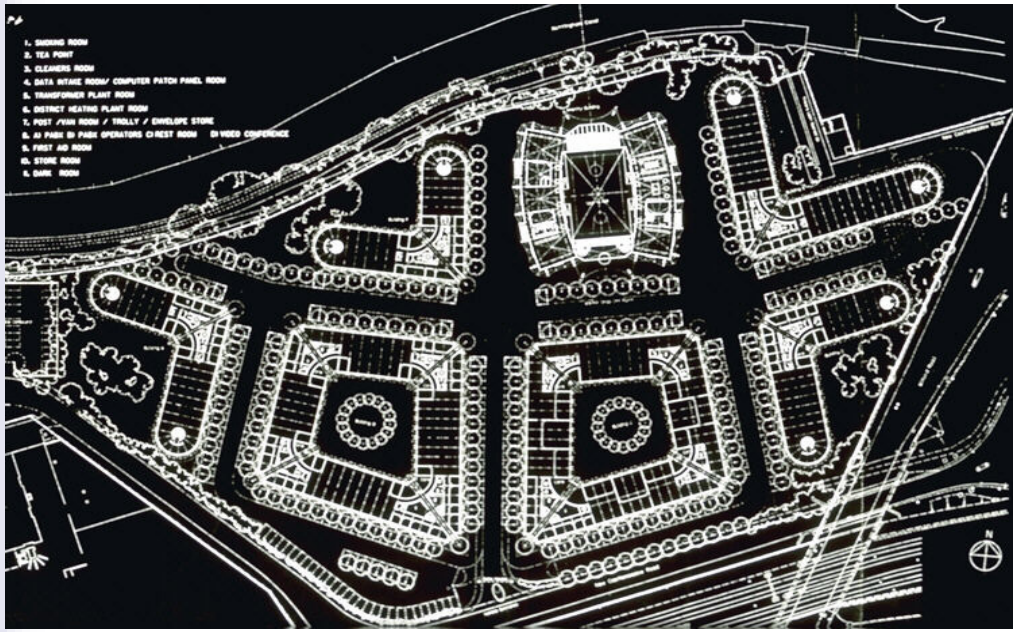


Photo: Arup Engineers

Photo: Hopkins and Partners

3. Triple-glazing with between-pane adjustable blinds

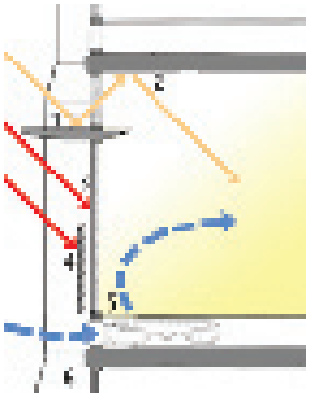
4. Balcony and shading devices

5. Fresh-air inlet with occupant-controlled fans allow windows to be closed in winter or to prevent outside noise from entering the space.

6. External brick piers provide lateral solar shading.

Construction

The buildings were extensively prefabricated to meet a tight construction timetable. Load-bearing brick piers were built in a factory, around steel lifting rods, in storey-height units. The pre-cast concrete shallow barrel vaulted floor units are one-bay wide and span the 13-meter-width of the building. The cantilevered roof structure has steel trusses supporting purlins and lead-clad plywood panels.



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Amenity Building

It contains a multipurpose sports hall, flanked by changing rooms on the ground floor and by a bar and restaurants on the balcony above. Daylight passes into the interior via several sun roofs. The PTFE roof of the Amenity Building is suspended from four raking steel masts, its edges propped on struts. Eye-shaped ladders tension the edges of the membrane and form clerestory lights. This roof structure was engineered by Arup and Partners. Its function is to form a membrane that can cover a large expanse while minimizing the amount of supports needed and yet remain safe for everyday use.

PTFE (PolyTetraFluoroEthylene) is also known as Teflon™ when manufactured by DuPont. It is a type of flourocarbon plastic with high chemical resistance, low- and high-temperature capability, resistance to weathering, low friction, electrical and thermal insulation, and "slipperiness."

Photo: Hopkins and Partners

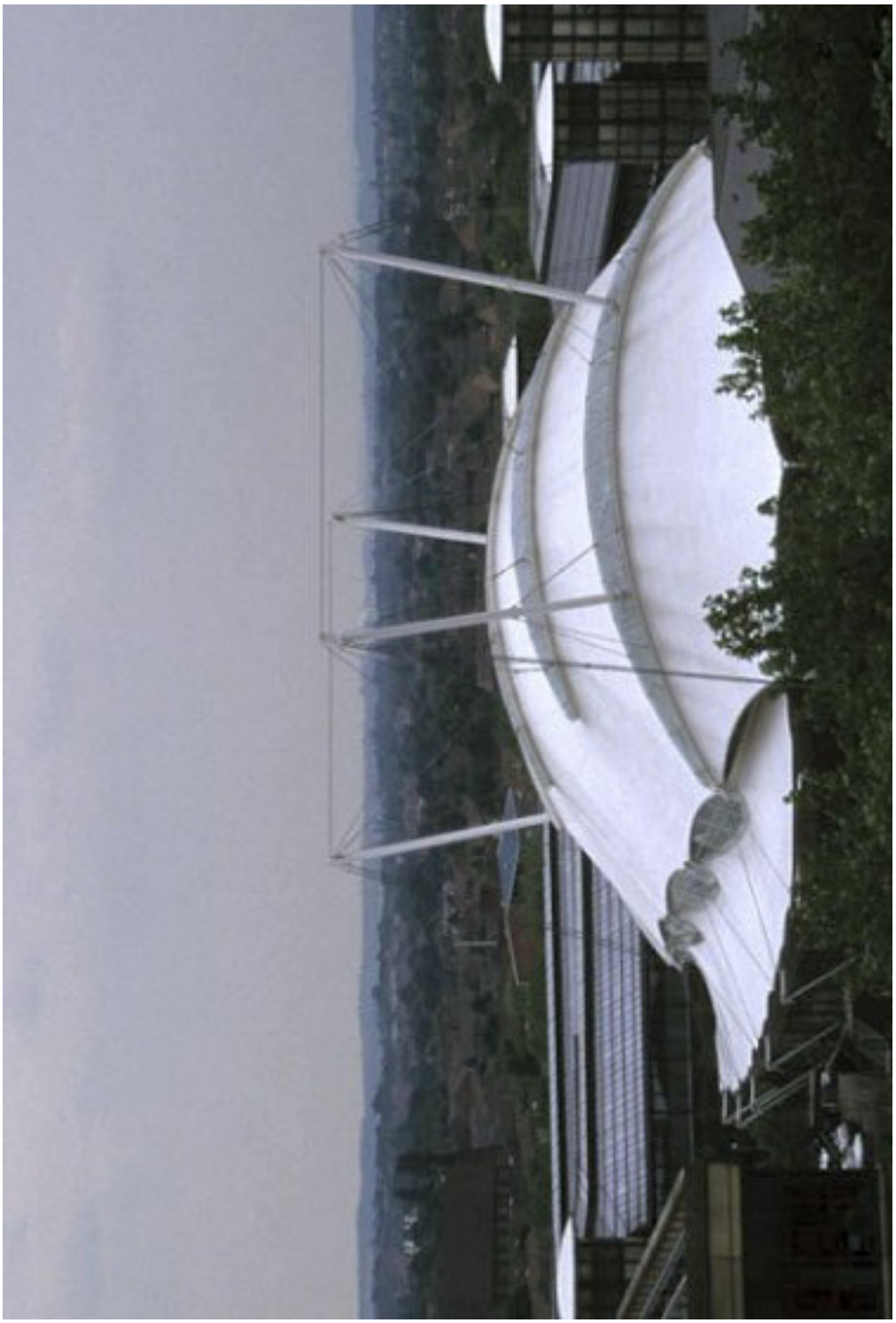


Photo: Yoshito Isono

Inland Revenue Centre—Nottingham

Construction Photos from Arup and Partners

Both the concrete floor and masonry columns were built off-site. Once adequately cured, they were transported to the site and assembled there.

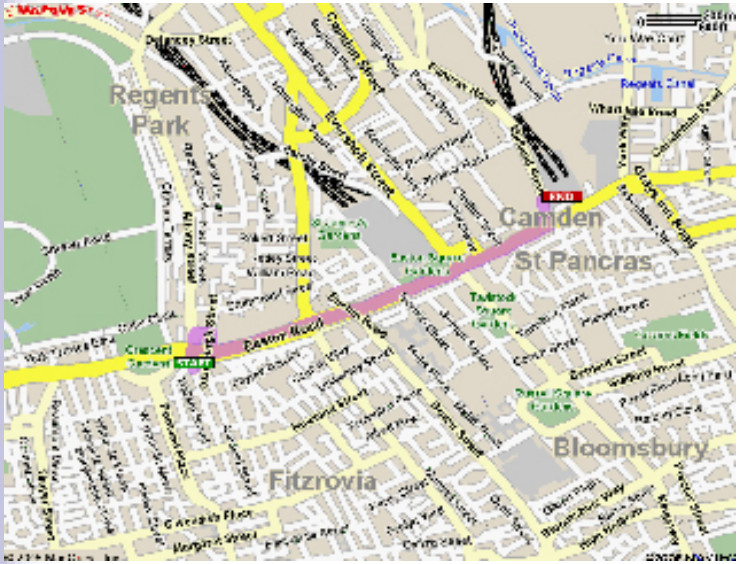
How to Get There—General Information

Train to Nottingham from London: Approximately 2 hours at £6–£71 per person.

Bus to Nottingham from London: Approximately 3.5 hours at £1.5–£5.50 per person.

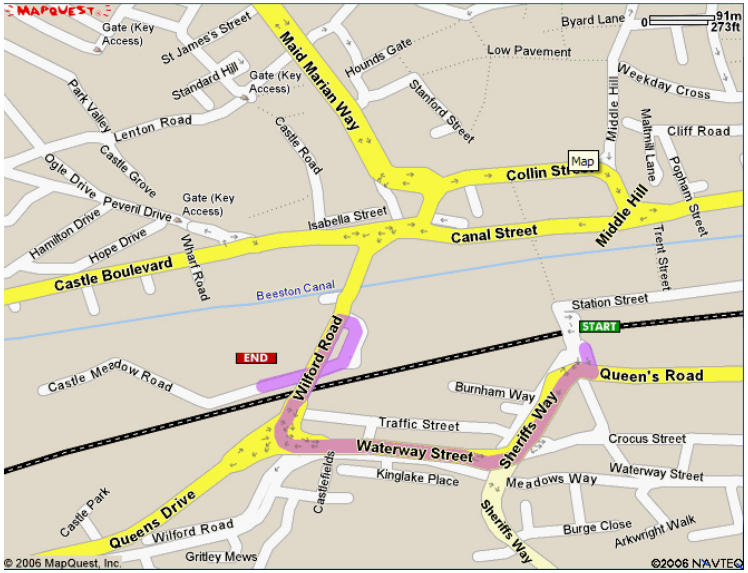
Approximate Distance to Nottingham from London: 120 miles

Step 1. Walk (or get taxi) from ISH to St. Pancras Station (approximately 1 mile).



Step 2. Board Midland Main Lines train and travel from London to Nottingham Station (approximately 2 hours).

Step 3. Exit at Nottingham Station, and walk (or get taxi) to New Meadows street to visit Inland Revenue Centre (approximately 0.6 mile).



(maps via mapquest.uk)

Resources

Boedeker Plastics <http://www.boedeker.com/ptfe_p.htm>

Hopkins and Partners <http://www.hopkins.co.uk>

Open guide to Nottingham <http://nottingham.openguide.org/>

Ove Arup and Partners <http://www.arup.com/>

Performance Building Façades <http://gaia.lbl.gov/hpbf/casest_h.htm>

Sustainability in UK Cement, Concrete, and Construction <http://www.concemsus.info/>

Willmert, T. "The Return of Natural Ventilation." *Architectural Record* 189(6) 2001: 137–146.

Case study by Jeremy Smith,
Spring 2006