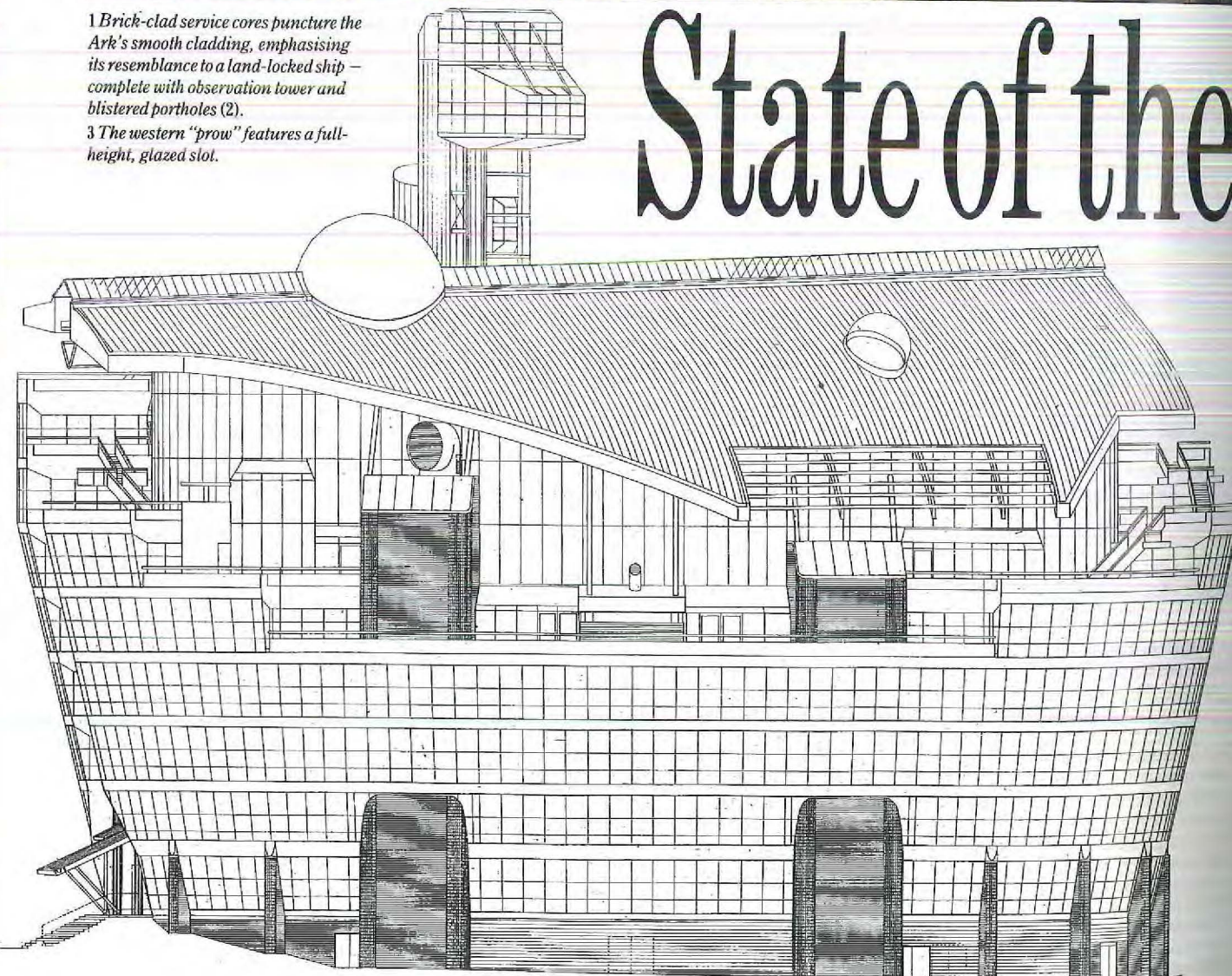




1 Brick-clad service cores puncture the Ark's smooth cladding, emphasising its resemblance to a land-locked ship — complete with observation tower and blistered portholes (2).
3 The western "prow" features a full-height, glazed slot.



State of the Ark

A curved form on a triangular site surrounded by 1960s blocks — the London Ark, designed by Ralph Erskine, represents innovation in many ways. Matthew Coomber reports.

MOTORISTS APPROACHING the capital from the west will already be familiar with the remarkable structure now nearing completion beside Hammersmith's busy Talgarth flyover.

But the London Ark's striking shape is not the only aspect of the building that will make it a landmark. For Swedish project manager Ake Larson, handling all aspects of the £33.5m building's construction, it also represents a strong statement of intent. For as well as adopting innovative design and construction management techniques, the firm is to take one floor in the finished building as its UK headquarters.

The Ark has been so named because of its resemblance to a land-locked boat — an impression reinforced by the brick piers at its base which look like the props used to support a vessel in a dry dock. The need for something so unusual is explained by the surroundings the new building has to compete against.

Aside from having to cope with noise and vibration from the adjacent major road and Underground lines, and being beneath one of Heathrow's approach routes, the building is

set in an extremely tight location.

Eighteen months into the 27-month modified design-and-build contract, British émigré Ralph Erskine's rounded design already contrasts sharply with the blocky 1960s buildings that surround its triangular island site.

The copper and glass skin that covers the rib-like floors of the Ark is almost complete. The profiled steel sheet of the bowed roof, complete with blistered glazed cupolas, is gradually disappearing beneath plywood in readiness for its final dressing of copper sheet. Structural steel for the observation tower feature is also nearing completion, adding to the nautical feel.

Toroidal shape

But the building's unusual toroidal shape — each of the first five floors above ground is larger than the one below — has combined with the physical restrictions of the site to affect many aspects of its construction.

All surveying, for instance, had to be carried out using the relatively rare co-ordinate system method, as there is hardly a straight line on the plan. Each setting out point on the construction grid was located, fixed and checked using £60 000

worth of electronic distance measurement (EDM) gear. But even this high-tech wizardry has encountered problems.

"We found that the five supposedly fixed Ordnance Survey points we used as datums for the EDM were in places like the joints between paving slabs and as much as 5 mm out," says Richard Hirst, construction manager for project manager Ake Larson.

The shape and nature of the richly textured, brick clad piers and fins further complicated the setting out process. A key element in Erskine's decorative design, these resemble giant chocks wedged against the overhanging flanks of the Ark.

The largest piers are in fact the external faces of four service cores which rise through the building, puncturing the otherwise smooth face. All feature a mix of broken engineering and heavily grooved lining bricks, the latter originally designed to take plaster or render. Hirst says great pains were taken to ensure these were built true.

"As the piers are built with the broken brick edges face out, there are very few points against which you can hang a plumbline.

We had to use a vertical laser to line them up."

Complex stainless steel forms guide the raking rear line of brick against which the final copper and triple-glazed cladding panels, by Italian firm Hallmo, are now being installed.

Although most of the cladding is already in place, this crucial section of work is still undergoing final design refinement by Hallmo in close conjunction with production architects Lennart Bergström.

Swedish partnerships

"We have had to adjust some of the substructure to get the piers to disappear into the structure the way Erskine wants," explains Gordon Swapp, seconded to Lennart Bergström from Rock Townsend.

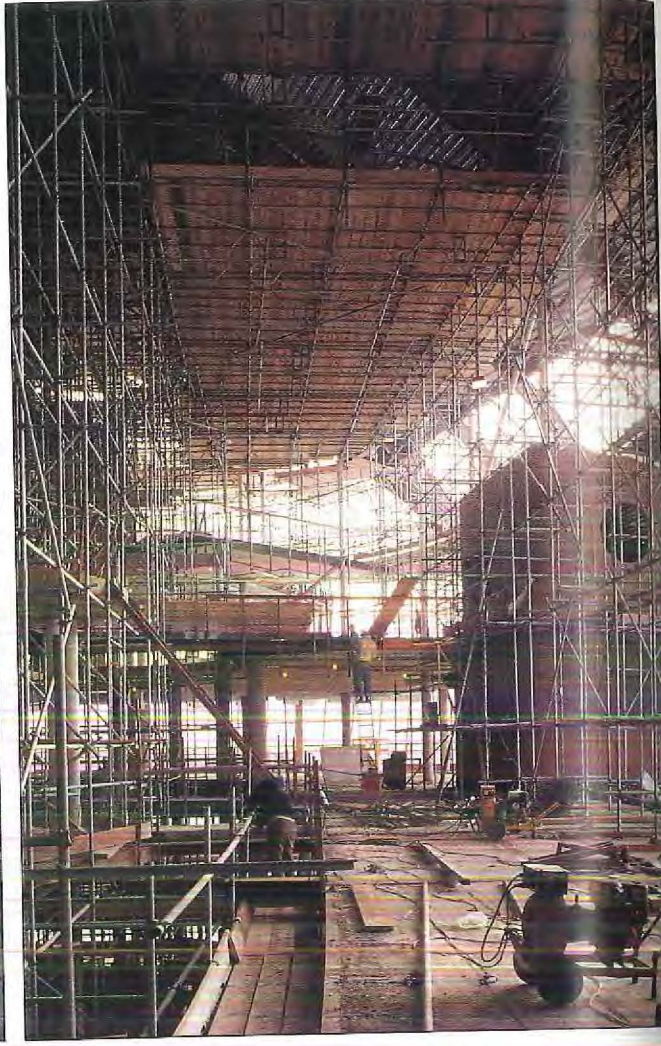
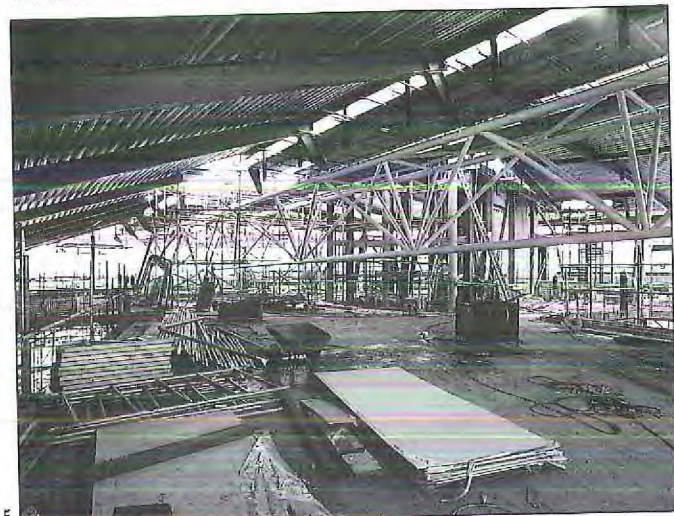
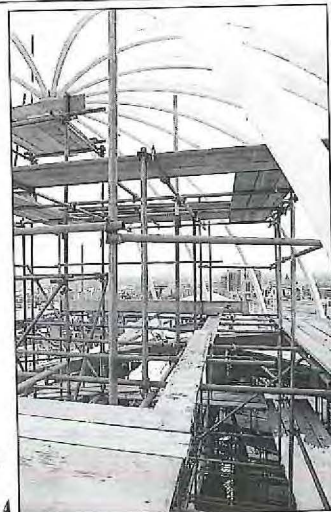
While the scheme design is by Erskine, all practical design has been handled by the fellow Swedish practice. British practice Rock Townsend acted as local conditions advisers in the project's early stages.

"Essentially, the guide form is a U-channel which gradually becomes an L-bracket over the top of the pier," he says. "It's a very clever bit of design by Hallmo — an elliptical curve ▶"

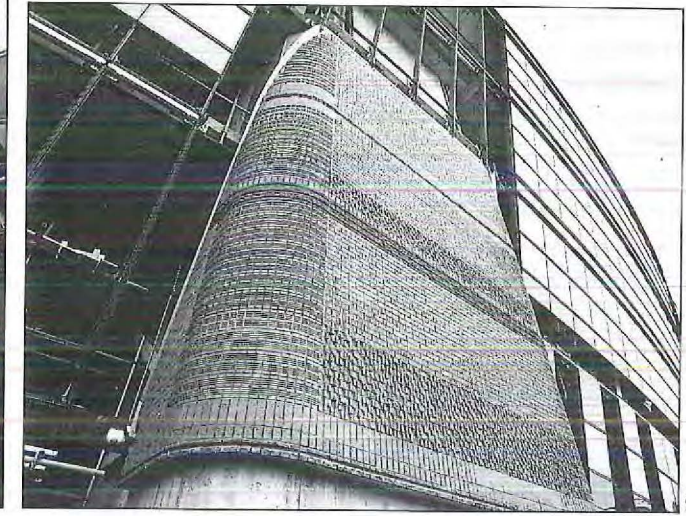


4 The ribs of an 8 m diameter cupola arch from the roof, which is sprung from a massive tubular steel lattice beam running along the building's spine (5).

6 Beneath, the south-facing indoor terrace at level five is taking shape, but still part-obscured by the forest of scaffolding needed to allow work on the underside of the profiled steel roof to continue.



7 A cherry picker stretches from the roadside up to scabble the top of the fins at the Ark's base. When complete, all the overhung cladding panels will be cleaned using the same machine.
8 Rooftop cupolas: spectacular views.
9 Ake Larson's methodical approach to brickwork combines with architect Ralph Erskine's novel use of materials in intriguing details on the four piers.



► which only ever bends in two dimensions."

He adds that it was Hallmo's willingness to go back to the drawing board and solve such problems that won it the job.

Inside, the building's 33 000 m³ atrium is now clearly defined, although it will remain partially obscured for another month by the forest of scaffolding that allows work to progress on the underside of the roof.

When complete, the nine-storey building will function as a single room with the triangular atrium as its centrepiece (see this page). Erskine's design calls for no barriers at the inward-facing edge of each floor slab.

To this end, the frame has been built using NS Steel's downstand-free composite decking system (see *Building* 22 June 1990, pages 62-63). Diaphragm strength has been increased with extra reinforcing bars welded to the supporting beam flanges, and then cast into slots in the Bison hollow core deck slabs.

The smooth soffit produced by the system is already apparent, broken on the upper floors by downstand partitions and convection heaters and chillers being installed by M&E contractors Fläkt. These will

eventually be concealed above an open slotted ceiling grid — essential for the functioning of the H&V system (see page 44).

Level five is where the office space opens out on to a large indoor terrace. Visitors will have a clear view south across London, or if they choose, be able to see up to the giant lattice beam from which the roof is hung. Picked out in white, this bears on the twin drums at either end of the atrium. Like all the exposed structural members, it is made of tubular steel.

Central to this space, a five-storey mushroom-shaped feature tower is now taking shape. It will be connected to all floors by aerial walkways.

Throughout the contract, both site access and storage space have been severely restricted. And when the building is finally complete late this summer, only the width of its one-way access road will separate it from neighbouring road and rail lines.

Extensive landscaping will be necessary to make up the levels between the southern boundary wall — a retaining wall belonging to London Underground, which falls within 1.5 m of the southern building line — and the roadside.

Materials storage has been

Air ducts and sprinklers

THE ARK'S open interior has required radical fire engineering treatment co-ordinated, designed and overseen by Margaret Law, of Arup Research & Development.

The key difference between the Ark and conventional office space is that the entire building is treated as a single enclosure, rather than a series of isolated compartments; all floors open on to the atrium space.

Four main service cores hold wider than normal escape stairs. In the event of fire, the cores are automatically pressurised by central air

ducts, supplied from roof level, to keep them clear of smoke.

Any smoke generated will rise into the atrium space, and be contained at high level. From there, it will be safely vented to the atmosphere through skylights over the building's massive central lattice beam.

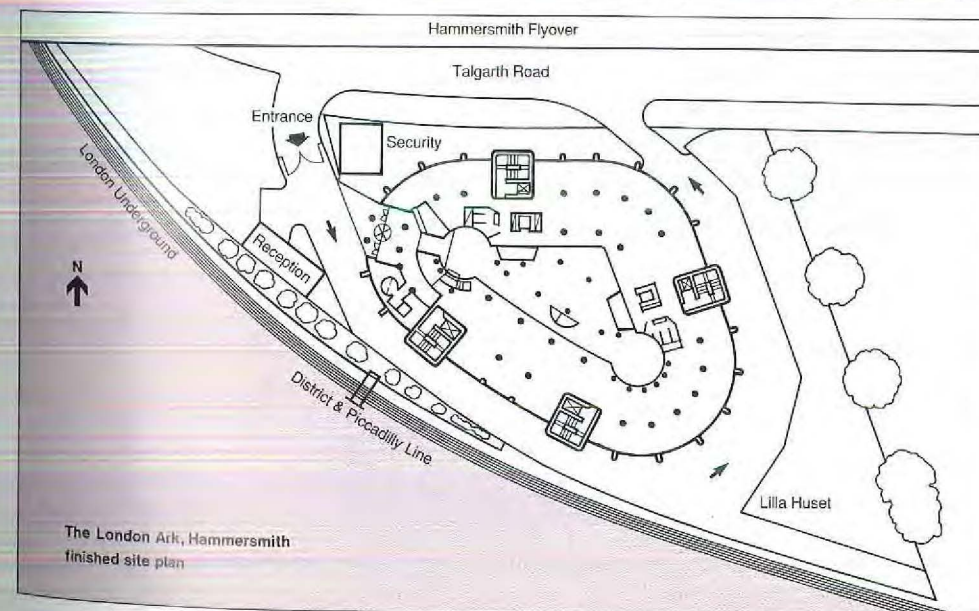
Sprinklers are installed on all floors, located beneath the line of the suspended ceiling and activated by smoke detectors installed at soffit level. In addition, hosepipes are installed on all floors and there are two dedicated fireman's lifts within the protected service cores.

partially eased by the windfall delay in the start of an adjacent building contract. Hirst says Ake Larson has carried out major drainage and some site preparation work in return for temporary use of the land.

Despite this, there has been little room for site facilities. Hirst and his team work from four cabins stacked two-on-two at the western corner of the site. A

tower built to carry test panels for the cladding, is now being converted to ease this shortage, in preparation for meetings with prospective tenants.

All but a few of the work packages have been let as fixed price, design-and-build contracts, under Ake Larson's own modified D&B contract. Hirst says this has presented problems, particularly for the UK



consultants involved. "They seem to have found it quite hard to produce performance specifications without working up the full design," he notes. Subcontractors too, he explains, have experienced teething trouble with Ake Larson's work management methods. "They seemed not to quite grasp it until we solved the first few problems together."

However, this relaxed but efficient style now permeates the whole site, lending an air of informal but disciplined co-operation.

"Where necessary we have asked for schedules of rates to be included with the tender documents, in case there are alterations. But in general, once the price is set, the work is done for that price," says Hirst.

This may sound aggressive, but Hirst maintains the Ake Larson work ethic is very non-confrontational. "The reason we can largely keep to the original price is that we resolve any problems immediately."

This approach hinges on three levels of site meeting: monthly A meetings, attended by owner Talgarth Estates, at which progress and cost reports are

presented; fortnightly B meetings, attended by all subcontractors and relevant consultants; and daily ad hoc C meetings, at which specific design or construction problems are sorted out.

There are few formal requests for information. The intention is to resolve problems swiftly "to allow construction workers to concentrate on real issues," says Hirst.

He sums up: "In the two and a half years I've worked for Ake Larson, I've written as many letters as I would have in two and a half weeks with conventional construction management."

But the site phone bill for the Ark will be large. "There have been, and still are, a lot of calls to Sweden," says Hirst.

Another interesting feature has been the degree of co-operation between suppliers and installers. Precast staircases for the service cores, made by Irish firm Breton Roconcrete, have been issued free to NS Steel, and their delivery phased so that safe access could be maintained to each floor as structural work was completed.

This method of meshing subcontractors and suppliers together seems to have ►

Blowing hot and cold

THE HEATING and ventilation system being installed at the Ark by Fläkt Environmental has been designed to a performance specification by Swedish consultants Scandiaconsult and UK partners Dale and Goldfinger.

Created to suit the open environment of the Ark's nine floors and atrium, the system works on, nominally, four air changes per hour. It employs three main elements:

- At each floor's perimeter, a series of aluminium radiant heaters supplied by low-pressure hot water are now being installed. Their final position will be adjusted so that they are concealed above the slotted suspended ceiling.
- Further in towards the building's core, chilled water "convective" elements, at slab

soffit level, pour cool air into the office space. The emphasis has been placed on cooling because of the building's massive potential for solar gain — although it is copper-tinted, the cladding contains no solar control elements:

- Fresh air, drawn in from ground level on the building's south side, is also provided above the ceiling at constant volume and temperature. Falling through the suspended ceiling, this fresh air mixes the hot and cold air, resulting in a natural progression of stale air towards the atrium space.

Overall control is effected through the building's energy management system, although individual rooms can be controlled separately. Various options for automatic shading are still being considered.

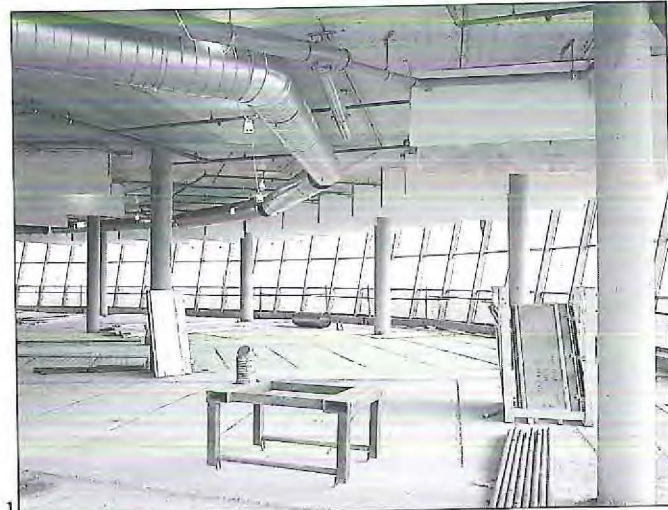
► worked well, despite the potential risk implications of late delivery or inaccurate fabrication.

Hirst reports no problems and says: "We had plenty of warning when the stairs were going to arrive, as they were coming from Ireland." The same is true for the structural steelwork, which had a three-day journey from Sweden.

Free issue of materials has also been used to ease the installation of the glazing: Hirst even placed the two firms involved, Hallmo and high level glazing firm Viktoria Systems of Denmark, in the same site office to ensure they would "get on".

He says their relationship will be essential for the glazing of the slot feature on the western "prow" of the building, now under way. Located beneath the line of the central lattice beam, this 3 m wide glazed channel extends the full height of the building, and is oriented to show Hammersmith church spire across the road.

Viktoria's clear glass panelwork is cantilevered off tubular steel attached to the inside faces of the slot. So, to smooth installation, the firm has been supplied with the Hallmo panels immediately adjacent to its own.



The London Ark, Hammersmith
client
 Talgarth Estates
project organisation and management
 Ake Larson
architects
 concept: Ralph Erskine
 production: Lennart Bergström
 Arkitektkontor
 local conditions advisers: Rock Townsend
structural engineers
 substructure: Andrews Kent & Stone
 superstructure: Scandiaconsult AB
 M&E



10 Elbow-shaped glulam sections will support the rooflight/smoke vents above the central lattice beam. The structural steel of the observation tower nears completion above the roofdeck, awaiting its top dressing of copper sheet.

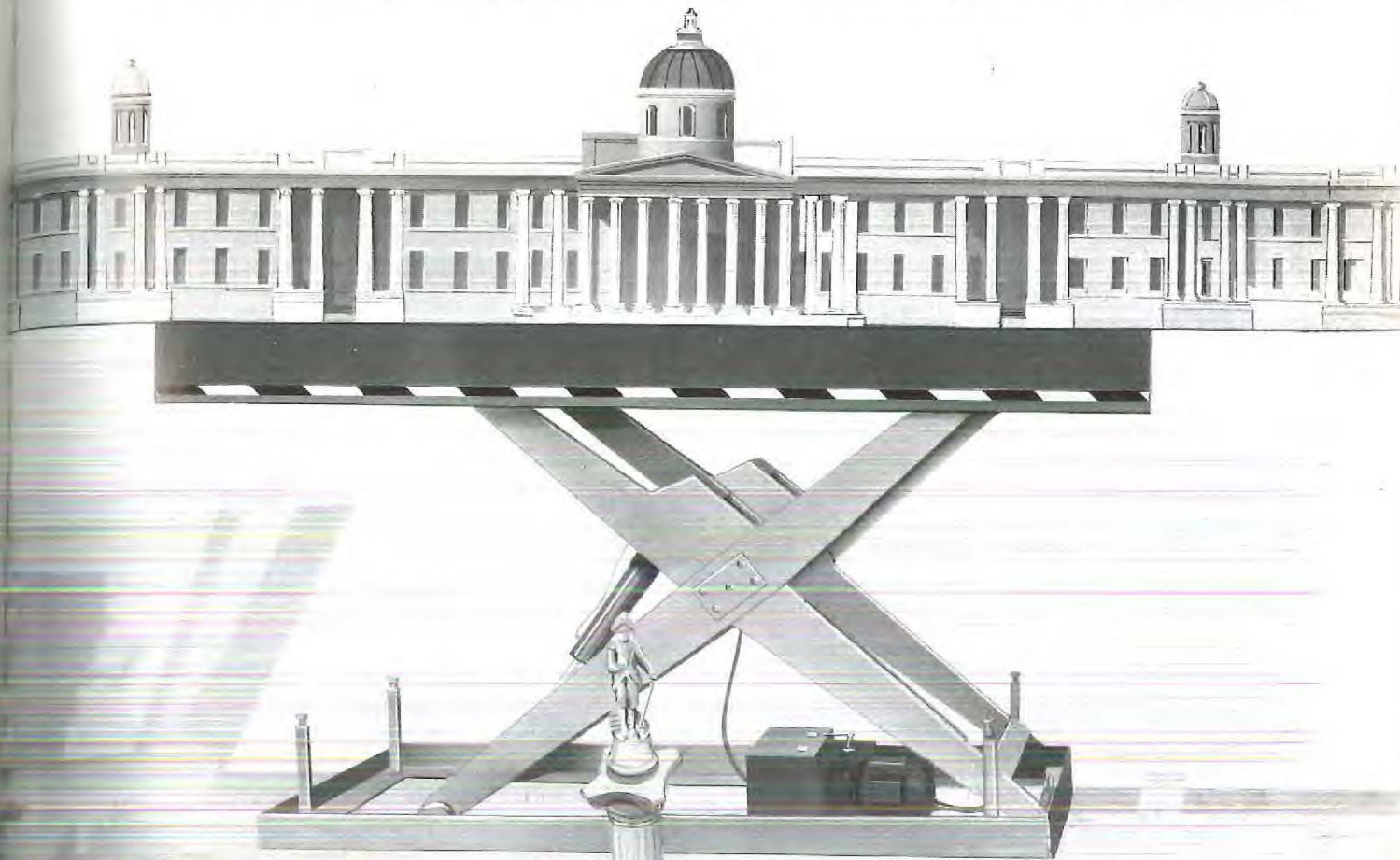
11 Non-structural partitioning downstands and pipework for Fläkt's H&V system are the only interruption to NS Steel's downstand-free soffit.

principal subcontractors
 Cementation (piling and foundations); Hallmo (cladding); Viktoria Systems AS (high-level glazing); BM Alford (brickwork); Comet Roofing (London) (profiled steel roofwork); Hook & Slate (copper roofing); NS Steel Construction (structural steel); Breton Roecrete (precast staircases); Fläkt Environmental (M&E).

Scandiaconsult AB with Dale & Goldfinger
acoustics
 Scandiaconsult AB with Arup
Acoustics
 fire consultant
 Arup Research & Development
contract type
 fixed fee manage, design and construct
contract period
 27 months: started September 1989, completion scheduled for December 1991
contract cost
 £33.5m

Building 1 March 1991

Q. WHO DID THE NATIONAL GALLERY TURN TO WHEN THEY NEEDED A LIFT?



A. BRITANNIA LIFT LTD

But then - as market leaders since 1963 - Britannia Lift are Old Masters in the art of engineering versatile hydraulic scissor lifts and systems. Ever state-of-the-'art', we have developed in-house computer aided management systems and batch production techniques coupled with modern machinery and methods. The result is a portfolio of products that includes wheelchair, warehouse, factory, showroom and goods lifts.



BRITANNIA LIFT LTD.
SCISSOR LIFTS AND SYSTEMS

New Road, Sheerness, Kent ME12 1NB
 Tel: (0795) 664581 Telefax: (0795) 580 480 Telex: 96260

BUILT IN BRITAIN FOR THE WORLD

► ENQUIRIES: 777

