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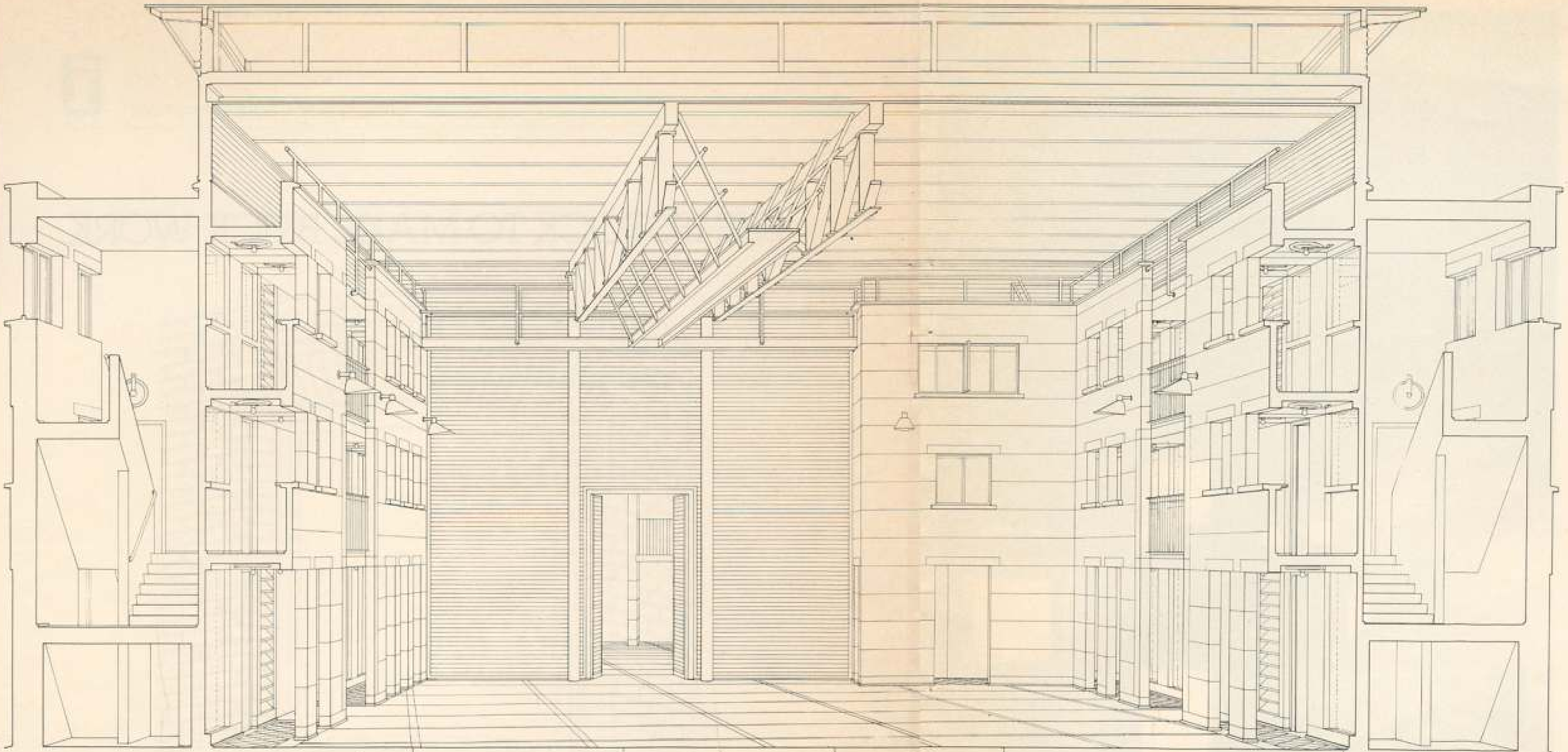
EAST END STREET THEATRE: THE HALF MOON SHINES ON

PRACTICE: INTEREST ON CONTRACTORS' CLAIMS

THE ARCHITECTS' JOURNAL/14 AUGUST 1985/90P



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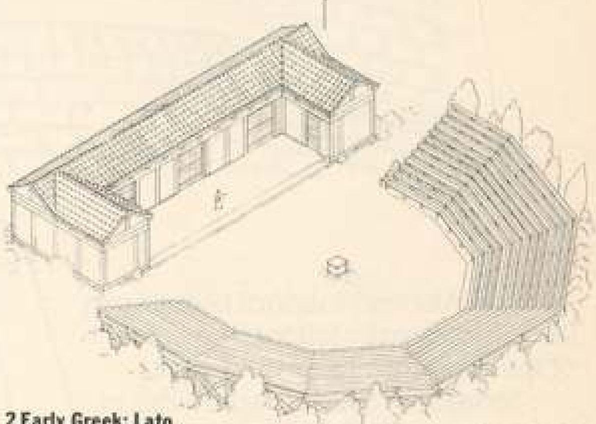
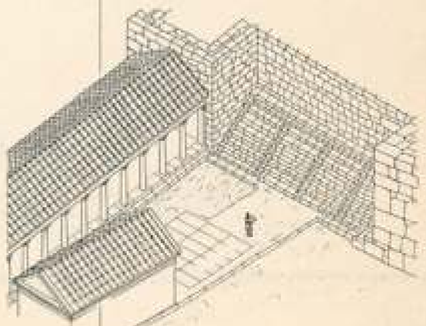
STREET THEATRE

The Half Moon Theatre, in the Mile End Road, east London, opened on 1 May and represents an exciting return to an early, authentic form of theatre. Designed by Florian Beigel and the Architecture Bureau, the theatre contains a square-plan auditorium (as well as the smaller, independent Young People's Theatre) with a flexible and specially designed system of seating boxes.

Walter Segal discusses the Half Moon in the context of current theatre design, while the acoustics consultant, the services engineer, the quantity surveyor and the structural engineer give accounts of their involvement. Photographs by Peter Cook.



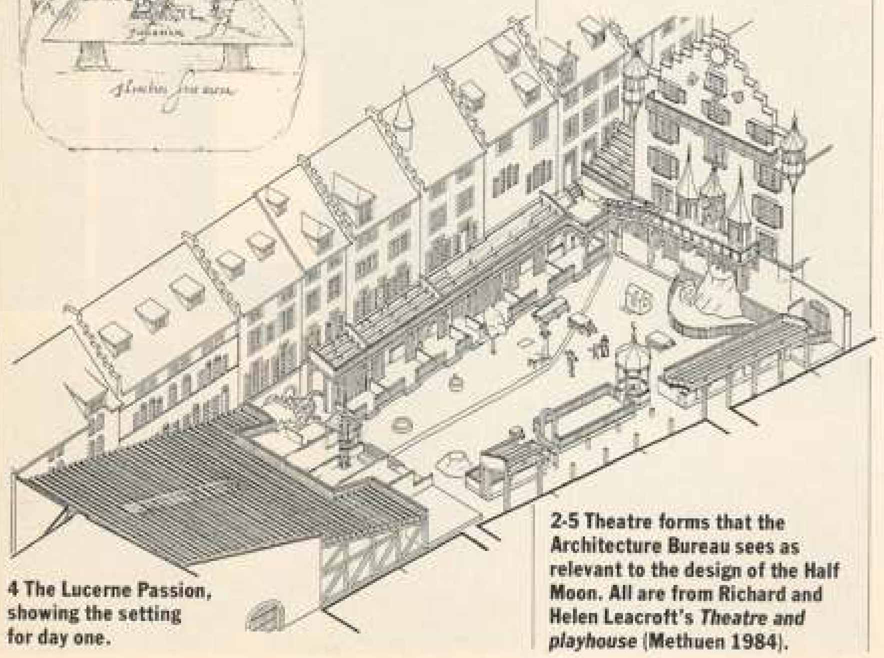
2 Early Greek: Lato.



3 Early Greek: the theatre at Eretria, Greece.

5 The Elizabethan theatre—The Swan after de Witt.

1 View of the Half Moon Theatre's auditorium looking south. The drawing shows the 'scene street' roofed over. The curtain wall with the large doors delineates this space from the scene street open to the sky (referred to as the public courtyard off the Mile End Road). Drawn by H. Welp.



4 The Lucerne Passion, showing the setting for day one.

2-5 Theatre forms that the Architecture Bureau sees as relevant to the design of the Half Moon. All are from Richard and Helen Leacroft's *Theatre and playhouse* (Methuen 1984).

WALTER SEGAL'S APPRAISAL

No playhouse has been built in London's East End for more than 100 years. The drift west that began in London towards the end of the eighteenth century affected many places of entertainment, and the concentration of theatres and playhouses in the West End is an obvious consequence of this drift.

This was the period of the rise of the commercial theatre. Squeezing as many seats as possible into a minimum of space did not permit much progress in the development of public areas around the auditoria, and circulation in the buildings remained dismal and mean. Spectators had to accept overcrowding and in such a limited space the stage arrangements were restricted, though standards rose during the last century. Many such playhouses are still in operation in our large towns due to the growing craving for entertainment.

Where space permitted and commercial attitudes became diversified—also during the nineteenth century—the modern concept of the playhouse could develop. This is based on the relationship of three elements: stage, auditorium and foyer, each of which advanced and developed in sequence.

Playhouses became directional and increasing attention was paid to spacious and interesting circulation. The stage in turn became a machine of ever-increasing efficiency, able to fulfil more and more sophisticated demands. While the stage remained the principal focus of the playhouse, the foyer formed a secondary focus where the new consideration for the convenience of the spectator could improve the attraction of the playhouse.

Many variations on the theme of the playhouse organism formed of three parts appeared throughout the century. These elements were more and more clearly defined and separated from each other until it became obvious that such playhouses needed to be freestanding because of their space requirements. They could thus assume a new role in urban design.

Then, at the beginning of this century, there was a tendency to eliminate the separation of stage and auditorium and designers tried to extend the stage into the latter. This, at best, remained a half-way solution but the desire was there and it had somehow to be answered. The most radical approach to this problem is the unification of stage and auditorium. London now has a theatre which goes further in this direction than any other attempt—it is the new Half Moon Theatre in Tower Hamlets, an imaginative and sophisticated structure built a stone's throw from Stepney Green underground station.

The awkward site provided a stimulus for designers Florian Beigel and his associates and with an understanding client this 400-seat theatre is among the most interesting advances in theatre design.

However, the unification of play area and spectator area is not this building's only innovation. Conceptually it is also a return to the street theatre of the past or the play space in the market square where actors and audience mingled freely. Indeed the designers conceived a street with three-storey buildings on either side (or rather, facades with galleries behind). All action is intended to take place on the street—a completely flexible stage. A simple and adaptable seating construction allows four basic seating arrangements and scope for variations.

This street is closed at either end by a trapezoid sheet curtain wall with high doors reached from Mile End Road through two gate lodges and an arcaded open court. Altogether the use of the awkwardly shaped site is ingeniously conceived in three parts: the existing chapel to the west of the gate lodges (later to become a foyer); the arcaded open court; and the auditorium, from which a side door leads to a small garden and the Young People's Theatre.

All these different spaces are simply joined and permit varying use with the arcades as unifying elements. There is plenty of space about the auditorium proper and one can imagine the pleasure and enjoyment during intervals. There is a further open space to the north of the auditorium.

The auditorium has a box structure, with two sides in fairfaced blockwork and the north and the south ends closed by the metal screens already mentioned.

The lightweight metal roof (similar to the curtain walls), ingeniously supported and braced, is intended to look as though it is floating over the walls. A considerable amount of care and ingenuity went into the design of the services and the lighting and this seems to have produced the required results.

The Half Moon Theatre's location in the East End promises to give young people something of their own, attract them and present to them their world and the world beyond. What kind of plays can they hope to see in this new unified space? London is full of acting talent; innovation and improvisation are possible in this stimulating new space. The company aims high: will it find the playwrights to do the building justice?

The world of the theatre in London is consumed by staleness, dullness and silliness. Directors are slow to learn. As long as they can fill the West End playhouses they do not care. But the backlash may come sooner than they think and here lies the opportunity for Florian Beigel's new concept. The actors are in the street just like in the distant past and light, atmosphere, colour and life are produced by modern methods: it is a prescription that could succeed.

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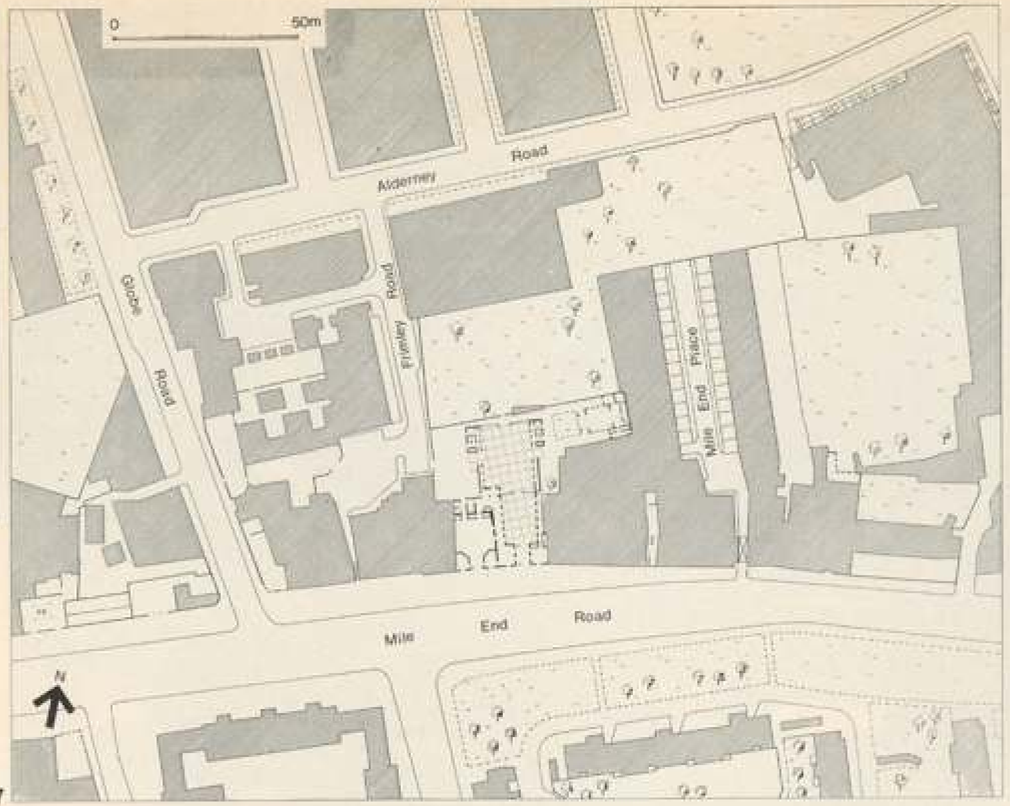
6 View of the main auditorium looking south. See 1.



7 Site plan showing the urban context of the theatre.

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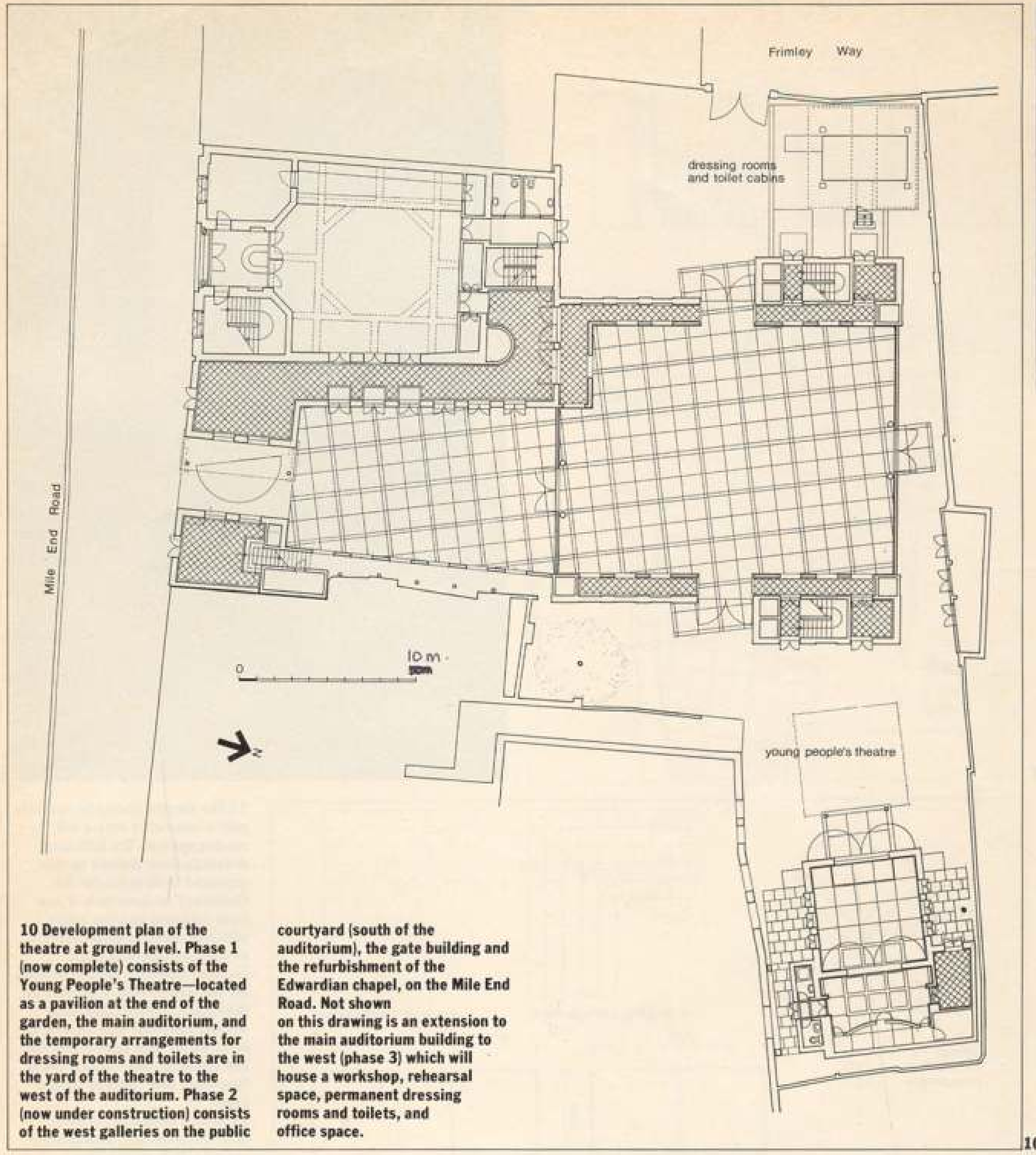
8 Looking west, showing the theatre in its context.
9 Young People's Theatre. Pavilion at the end of the garden. The normal entrance is from the patio.



10 Development plan of the theatre at ground level. Phase 1 (now complete) consists of the Young People's Theatre—located as a pavilion at the end of the garden, the main auditorium, and the temporary arrangements for dressing rooms and toilets are in the yard of the theatre to the west of the auditorium. Phase 2 (now under construction) consists of the west galleries on the public courtyard (south of the auditorium), the gate building and the refurbishment of the Edwardian chapel, on the Mile End Road. Not shown on this drawing is an extension to the main auditorium building to the west (phase 3) which will house a workshop, rehearsal space, permanent dressing rooms and toilets, and office space.

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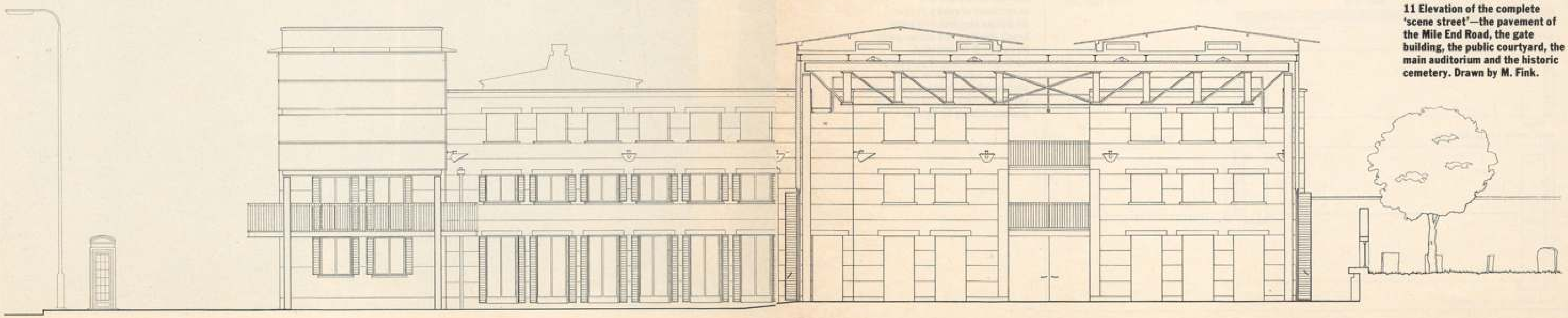

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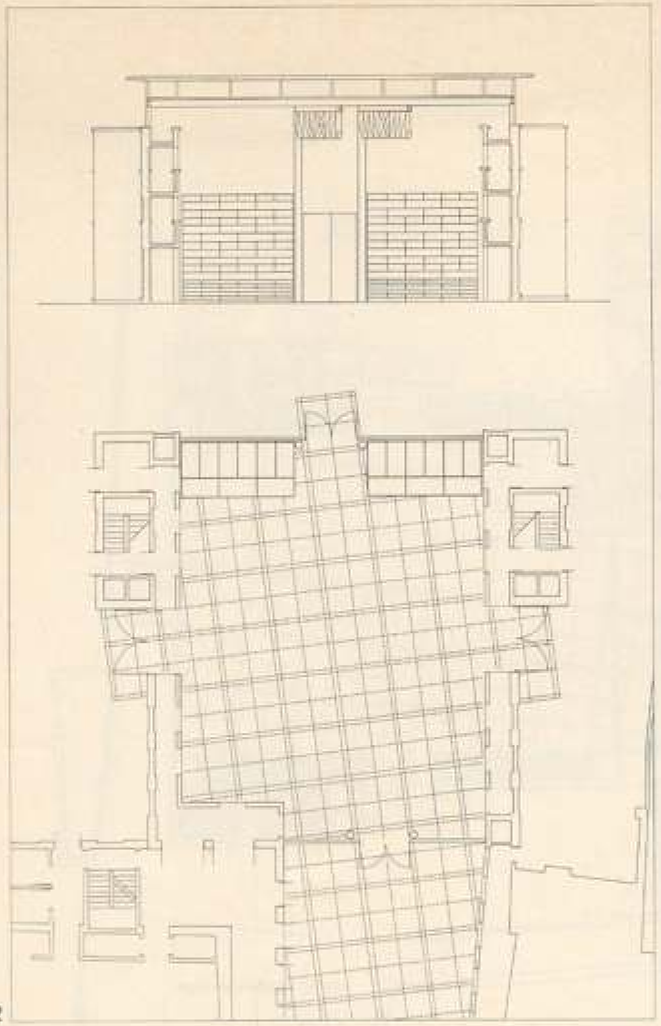
11 Elevation of the complete 'scene street'—the pavement of the Mile End Road, the gate building, the public courtyard, the main auditorium and the historic cemetery. Drawn by M. Fink.



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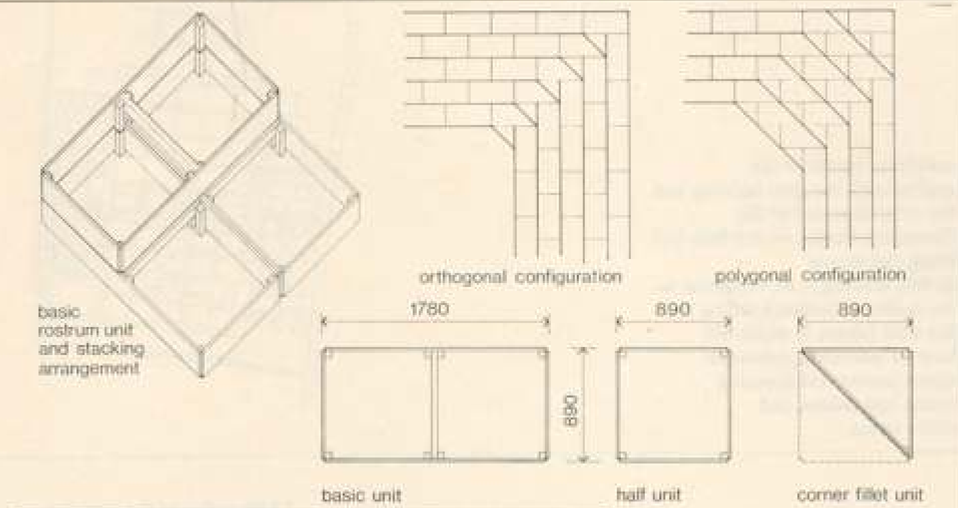

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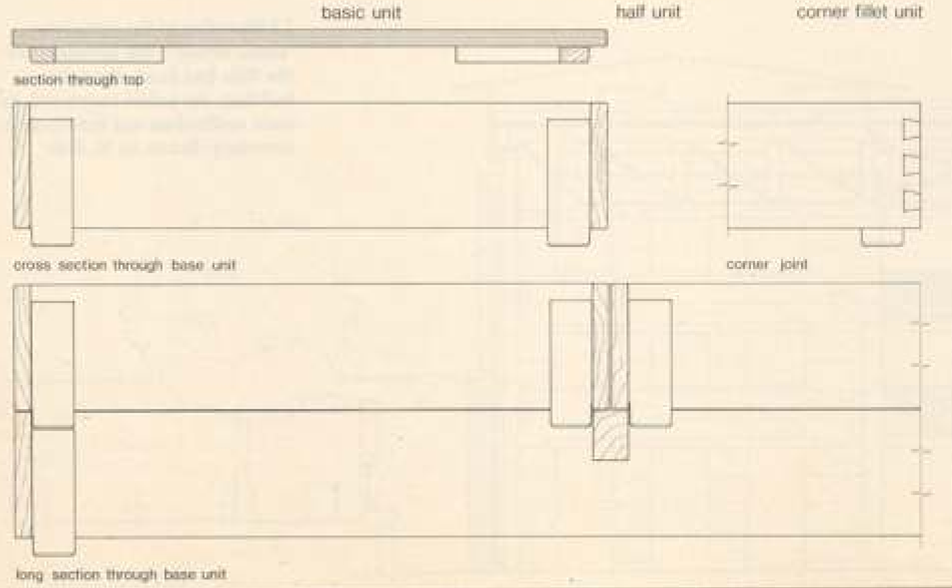

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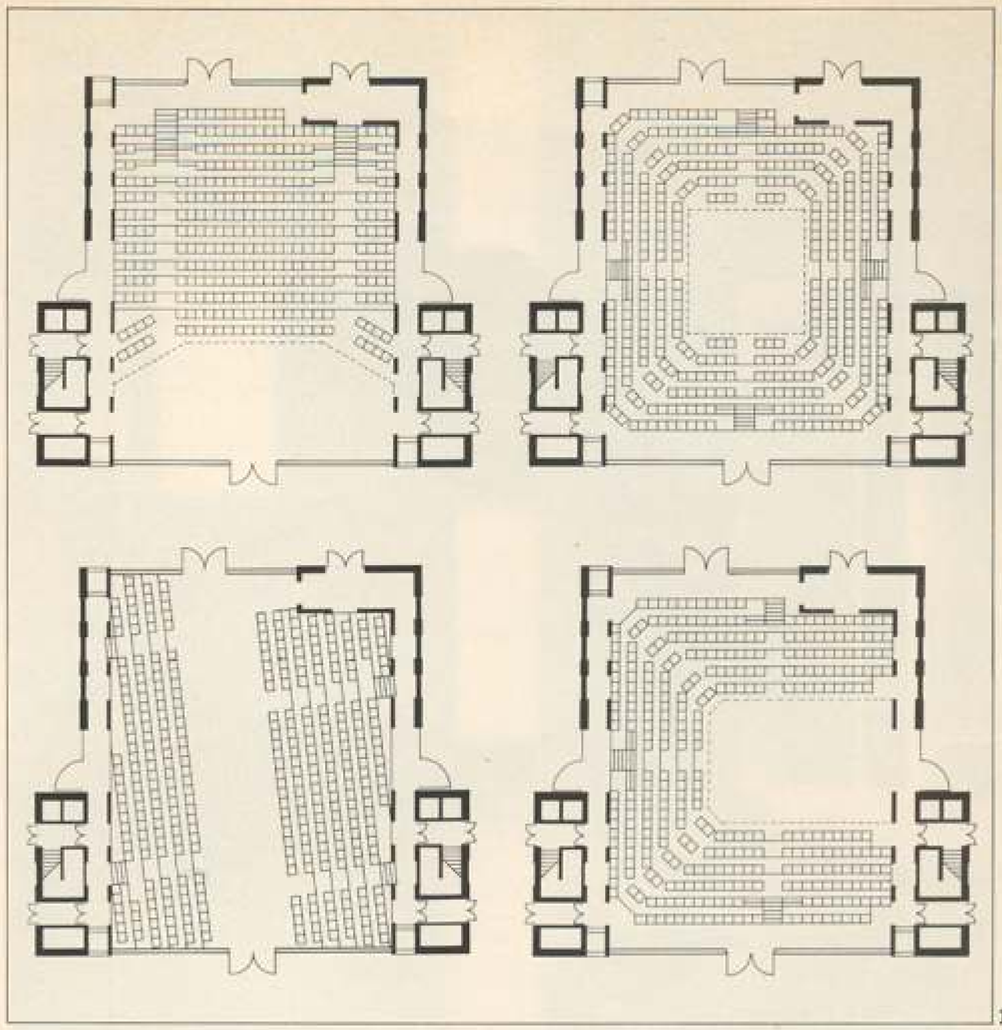
12 The theatre presently operates with a temporary rostra and seating system. The following drawings show the new system expected to be in use for the Christmas performance. It has been designed as a live project with part-time diploma students at the Polytechnic of North London. There are several options for the type of seat to be used on the rostra. Rostra stacked up against the north wall, leaving the hall free for uses such as the East End Festival, conferences, social functions, concerts and jumble sales.
13 Rostra geometry, showing basic rostrum unit, interlocking arrangement, corner plan configurations and the assortment of rostra shapes.
14 Rostra construction using beach planking and corner posts (drawn by B. Dagworthy).
15 Gallery seating. A person's weight is supported on the window sill, on the seat and on the knee-rest. Each seat is on a little podium. Joinery by Abatis.

16 Plan of auditorium showing possible seating arrangement.



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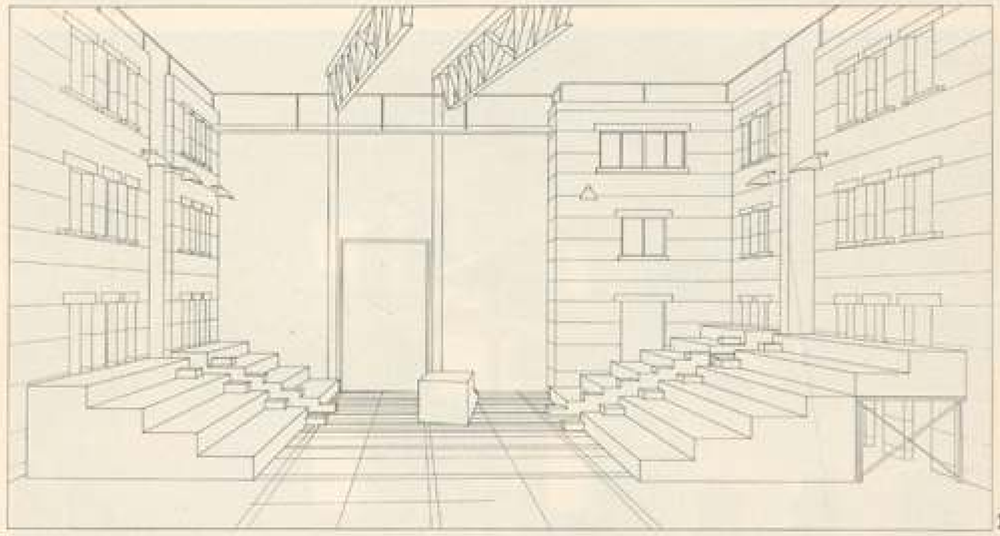
17 Rostra in 'promenade' configuration with 380 mm steps (drawn by J. Channe).
18 Rostra in 'free' configuration. The system permits 190 mm and 380 mm steps. It also permits the building of raised terraces and staging (drawn by J. Channe).



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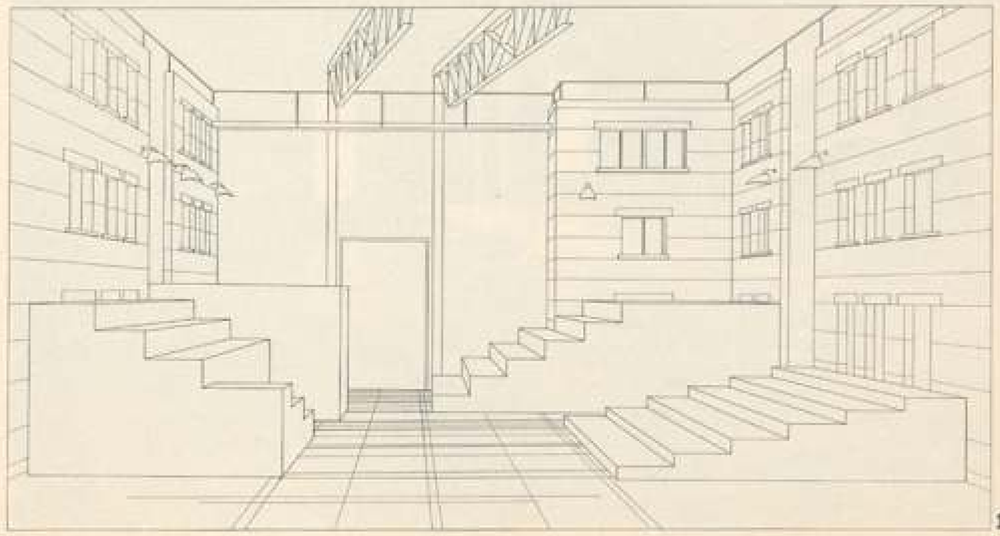

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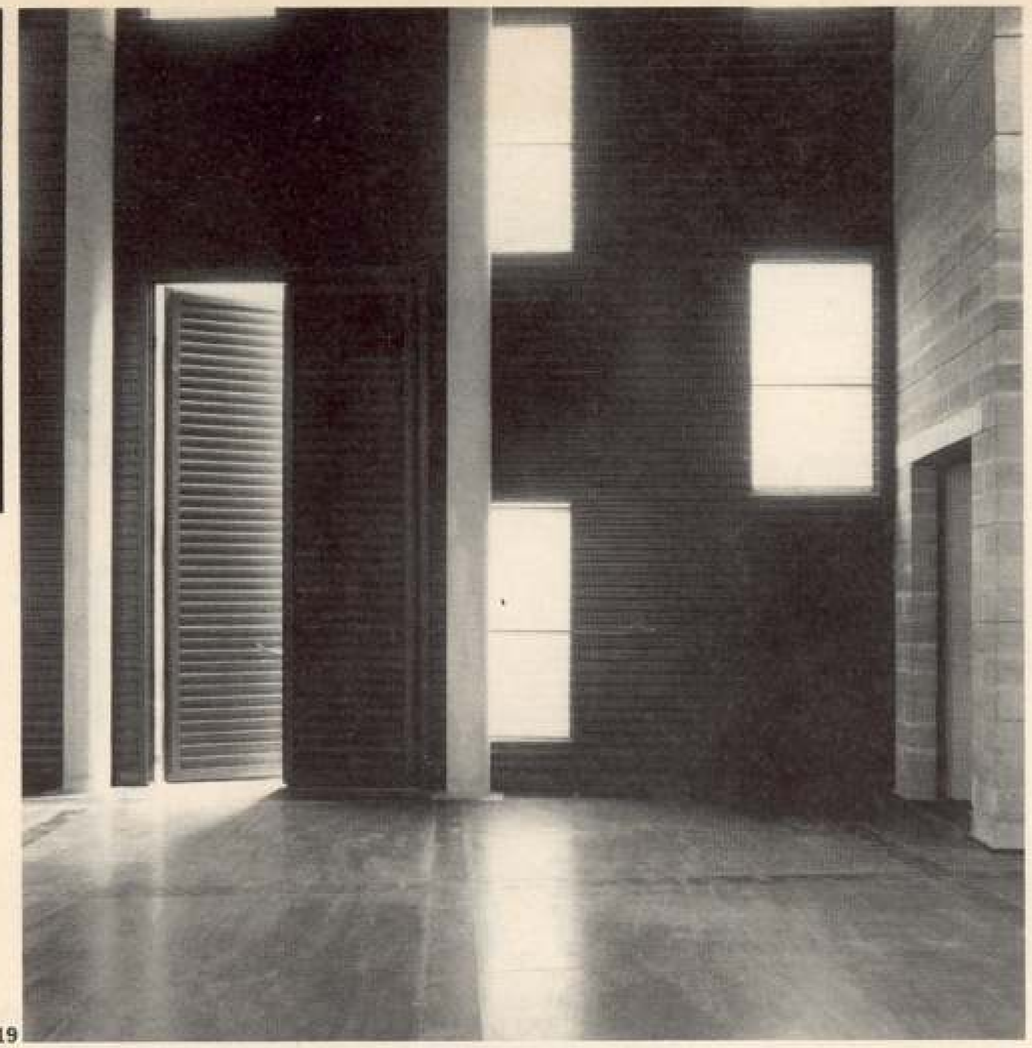

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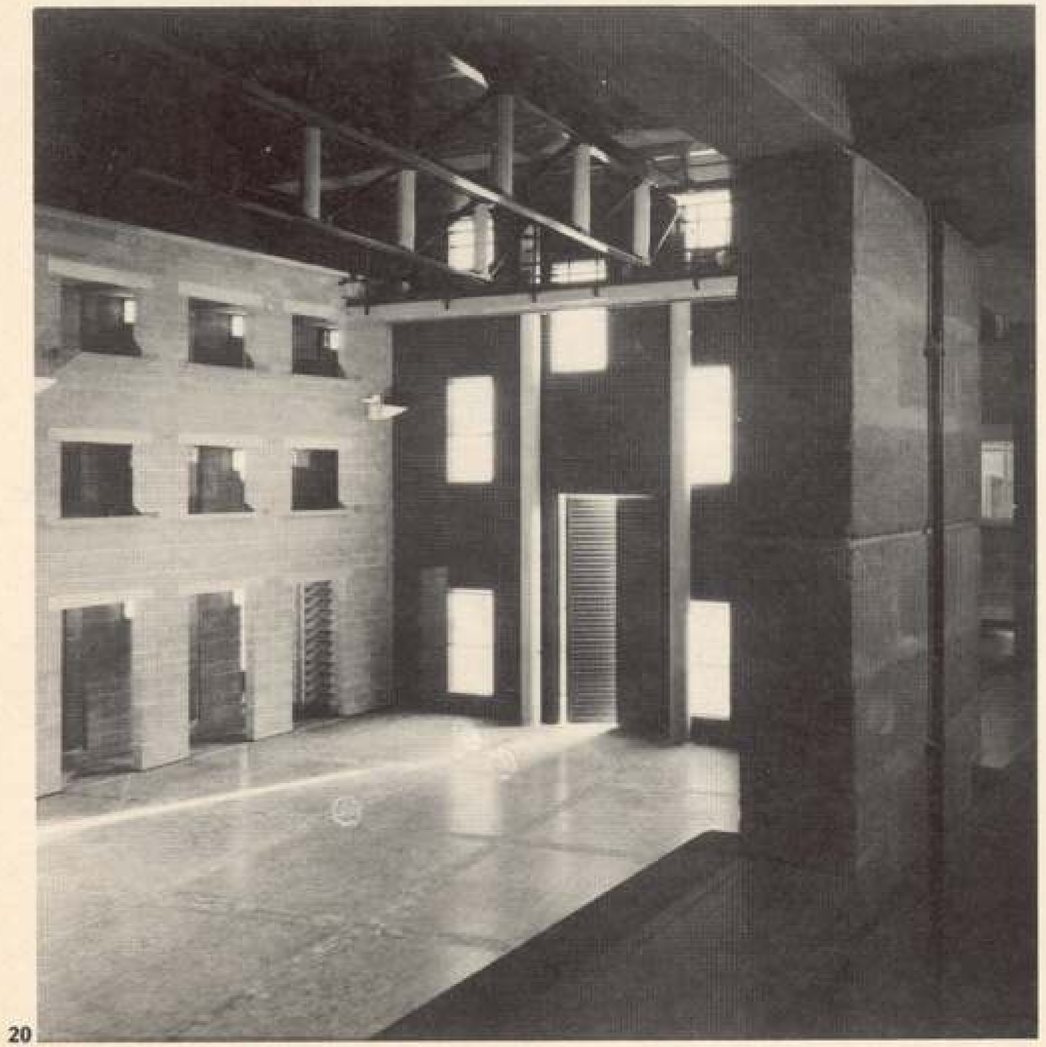
19 Primary architectural elements of auditorium.



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20 View of main auditorium from first floor gallery looking south.

21 View of auditorium through a mirror on ground floor gallery. Photograph by Denis Gilbert.

ROBERT SMITH OF DAVIS, BELFIELD & EVEREST

The quantity surveyor's comment

Initially it seemed that the Half Moon would have to compromise its ambitious development plans (see axonometric), but a strategy was developed whereby the building could proceed in affordable packages.

The existing chapel at the Mile End Road had to be mobilised as a provisional theatre. Its administration was accommodated in two London buses and the public toilets were provided in a custom-fitted cabin. The use of cabin/caravan arrangements for ancillary theatre accommodation proved flexible—on several occasions it was relocated to make way for the contractor. It also had the advantage that capital expenditure could be deferred through leasing arrangements.

The first phase of new works was divided in two: the basic package of a shell for the auditorium and the complete Young People's Theatre Club; and fitting out the auditorium. The contract documentation described both packages and asked tenderers to submit prices for fitting out the auditorium on the basis that authorisation to proceed with the work could be given 12 weeks from possession of the site, and a second price on the basis that authorisation could be given to proceed 24 weeks from possession of the site.

If building work did have to stop due to drying up of funds at the end of basic package work, the design had been developed by Architecture Bureau in such a way that the Half Moon could equip and operate its auditorium, although it would have to deploy *ad hoc* arrangements similar to those they had developed in their previous theatres at Alie Street and more recently in the chapel. The design catered for an even more basic fall back position: a scenic street *without* a roof.

The fitting out work was commissioned eight weeks later than the maximum envisaged in the tender. However, following negotiations with the main contractor, C. J. Sims Ltd, the orders for mechanical and electrical services, floors, ceiling, etc, were placed on the basis of the prices contained within the original tender for the addendum package.

Phase 1 commenced in May 1983 and was practically complete by December 1985.

Phase 2 started in February 1985 and was also split up into the following stages:

- the shell of the entrance tower that links the auditorium to the Mile End Road had to be completed by August
- the fitting out of the entrance tower
- the courtyard with its west galleries and a provisional landscaping scheme on its east side
- the refurbishment of the chapel into a community foyer.

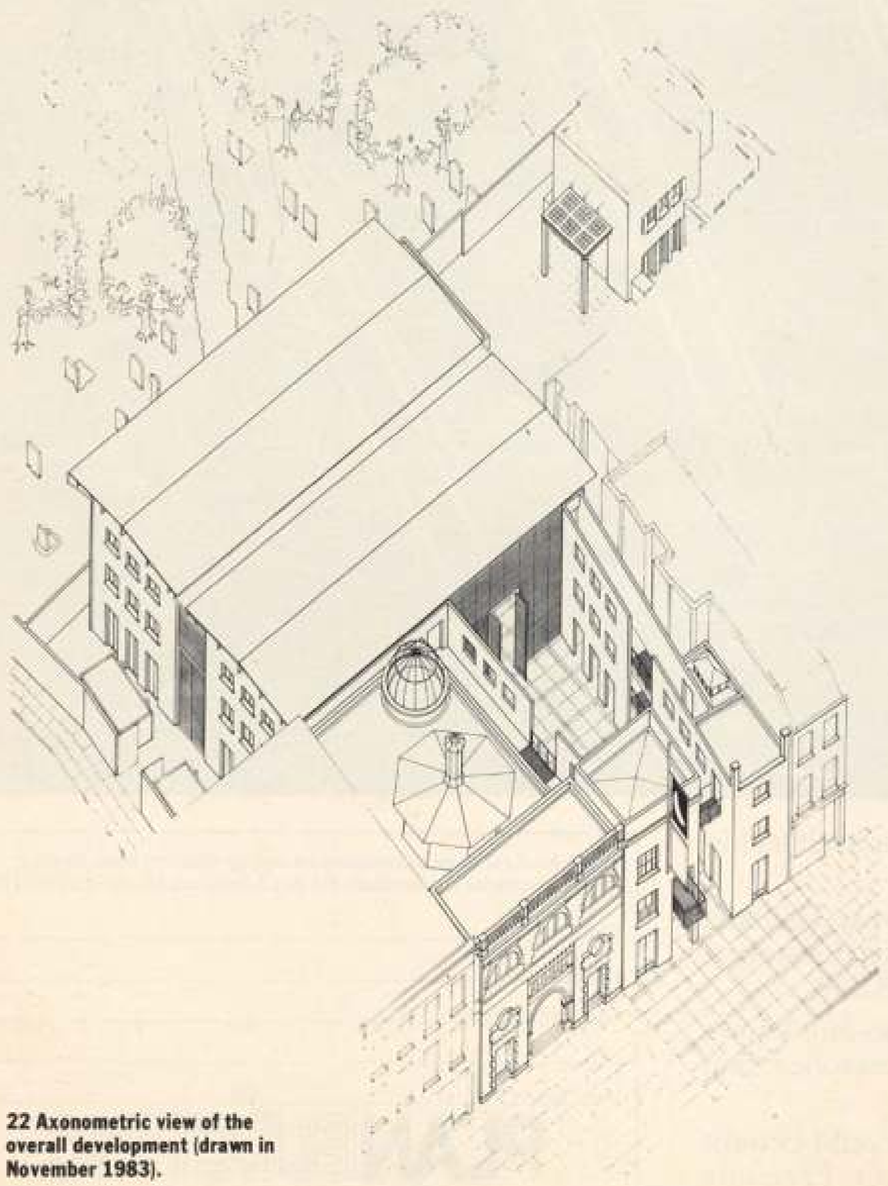
Phase 3 will consist of the technical extension to the west of the auditorium with workshop, permanent dressing rooms and toilets, rehearsal and office space.

It is difficult at this stage to make a direct comparison of the cost of the Half Moon Theatre with other theatres because it is not complete. Taking the cost of Phase 1, adding lighting and seating allowance (see seating drawings), adding the projected cost of the first two stages of Phase 2, the cost per seat (450 seats) is about £2250, as compared with the norm of £3000 per seat for a small theatre with all ancillary facilities.

One must not forget that the above still includes provisional elements such as a temporary bar in the chapel and dressing rooms and toilets in cabins, but the cost comparison indicates that the Half Moon is getting good value for money, especially considering the premium it is paying because of fragmented work processes such as:

- the client is uncertain about the availability of funds
- the contractor is uncertain about authorisation dates
- late design cuts in all packages due to frustrated fundraising efforts
- acceleration of construction due to mopping up of funds coming through at the end of a financial year
- keeping the theatre next door operational
- changing contractors between phases.

Funds for the development were, and are, coming from: the Arts Council of Great Britain; Central and City Properties in the form of a planning gain agreement; the Greater London Council; the Inner London Education Authority; the London Borough of Tower Hamlets; and a host of charity trusts, trade unions, and businesses.



22 Axonometric view of the overall development (drawn in November 1983).

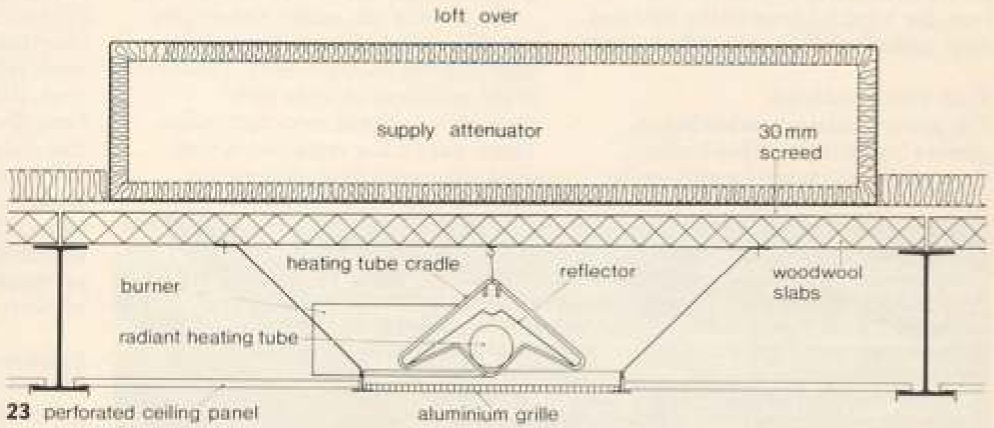
TERRY ROSE OF ROBERT MATTHEW, JOHNSON MARSHALL

The services engineer's comment

The heating design for the theatre is based on the idea that it is a multi-purpose hall where consideration must be given to noise reduction.

An industrial gas-fired radiant heating system is provided. It is economical in both capital and running costs and it is compact. There are eight gas burners plugging into two loops of 100 mm diameter steel radiant heating tubes suspended from the woodwool slabs in the ceiling void. An aluminium reflector over the tubes directs heat downwards through an aluminium grille in the ceiling. The products of gas combustion are drawn out by a vacuum pump. The burners are side-mounted because vertical space was limited. The tubes are suspended on hangers to accommodate expansion.

By using this economical system it was realised that it would be difficult to achieve NC 25, the general background noise criterion used in the design. The following measures were taken with the aim of achieving NC 30. The vacuum pump is housed in a chamber built with 200 mm concrete block accessible from the second floor stair landing. It is mounted on anti-vibration pads and it has purpose-built primary and secondary silencers. To reduce the hissing noise, the burners have been fitted with special air inlets. The air inlet for the heating tubes is in the loft. The system by Phoenix Burness cost £11 500.



23 Detail of ceiling heater.
24 Acoustic ray tracing diagram for 'in-the-round' and 'thrust' seating configuration. Refer to the comments of the acoustic engineer. Sound absorbed by the ceiling, A. Sound absorbed by the audience, B.

JOHN MILLER OF BICKERDIKE ALLEN AND PARTNERS

The acoustic consultant's comment

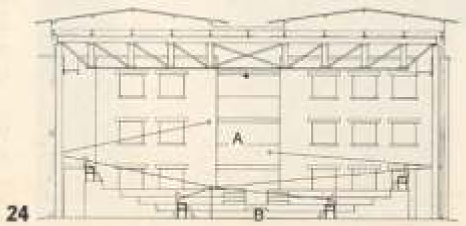
The Half Moon's auditorium is not large. Speaker-listener distances are 15 m for an 'end-on' stage configuration and less for 'thrust' or 'in-the-round' staging. Intelligibility rather than mere audibility was therefore the prime consideration in approaching the design.

Initial calculations for the Half Moon indicated that the 10 m high room with all finishes acoustically hard would have a reverberation time of 2 s, with an audience present. For a theatre of the size of the Half Moon, a 1 s reverberation time would be more appropriate. Rather than achieving this by reducing the ceiling height and therefore destroying the idea of the 'theatre in the street', it was decided that there should be sound absorbent surfaces in the room.

On the basis of ray tracing techniques (see diagrams) it was concluded that the ceiling is the most advantageous location for a sound absorbent surface for the following reasons:

- the high ceiling could contribute to undesirable late reflections in some parts of the theatre's auditorium
- the design provides for a variety of staging configurations, making it difficult to place absorbent surfaces on the walls to suit all the staging configurations
- the galleries create a complex surface geometry to the sides of the auditorium, which effectively scatters sound to ensure good diffusion in the auditorium
- the architectural concept is based on the street: the equivalent acoustic experience is created using sound-reflective buildings and an absorbent 'sky'.

The absorbent material used is fairfaced woodwool slabs above a perforated metal ceiling.



The end walls of the auditorium are acoustically reflective. Behind the perforated metal sheeting the sound is reflected by 12 mm Supalux board doubling up as fire protection.

Reverberation time measurements were carried out in the empty completed hall. At 500 Hz the measured reverberation time was 1·7 s. This will fall to 1 s when an audience is present.

The Half Moon's first production in the new theatre, the musical *Sweeney Todd*, began on 1 May 1985. The initial reaction to the theatre's acoustics is encouraging.

The sound insulation requirements of the building relate not only to keeping noise out—particularly traffic on Mile End road—but also keeping sounds created in the theatre from the ears of local residents. Measures include attention to the build-up of layers within the lightweight cladding and within the roof and the specification of high-performance doors.

The ventilation system created a number of apertures whose sound attenuation had to be considered. In addition to silencing in the two towers housing the builders' work extract ducts, attenuation had to be incorporated in the fresh air inlets. The summer inlets, at low level in three corners of the theatre, contain large splitter attenuators, while the winter air inlets located on the roof are attached to purpose-built absorbent-lined ducts.

BUILDING FEATURE

EDWARD MANN OF OVE ARUP AND PARTNERS

The structural engineer's comment

In general this is a conventional structure but there are several particularly interesting aspects which are described in detail.

Principles of stability

North-south wind loads
Two horizontal 'wind' girders at roof level on the north and south edges of the building together with the two steel platforms at technical level transfer wind loads on to the east and west galleries which act as shear walls.

East-west wind loads
The gallery slabs act as horizontal girders transferring wind loads to shear walls which are formed by the north and south walls of the stair blocks and the south wall of the projection room.

Roof structure
The unusual layout and the form of the main truss followed from the architects' wish that the roof steelwork, which can be seen from the auditorium, should reinforce the architectural concept of a scenic street.

The form of the main truss and its members were governed by architectonic requirements. The forms of the members express their respective notional structural roles. There were a few instances where rigid adherence to architectonics clashed with the requirements for easy fabrication. The dead weight of the roof is fairly high, for acoustic reasons, and so the bottom member is in tension even during conditions of maximum wind uplift, that is with a windward facing door locked open during a storm. The flat plate members of the main roof trusses are not able to accept directly applied theatre lighting loads.

The theatre lighting is at the moment mainly fixed to a separate lighting frame about 7 m by 12 m square on plan with electric hoists at each corner. This is hung from the roof structure via the secondary beams, that is, it is not directly attached to the main truss.

Since the position of the lighting frame within the roof area can change to suit the various seating or stage layouts, the roof structure has to be able to accept the appropriate hoist loads applied to any part of the roof area. Also lightweight scenery may be hung from any part of the roof area. The design allows for one point load of 600 kg applied at any point along each span of each secondary beam. This is approximately equivalent to a uniform load of 0·9 kN per square metre applied over the whole roof area.

25 Main truss/column connection. Refer to figure 27. Photograph by the Ove Arup Partnership.
26 Construction detail at the head of columns, showing main roof trusses on columns. The lower horizontal truss (walkway) tying into blockwork and concrete slabs on either side gives wind-stability to the stancheons of the steel curtain wall. The upper horizontal truss does this as well and is 1 hr fire-protected. It prevents truss collapse in the event of a severe fire in the main auditorium. Under this condition, the main trusses will soften and develop large catenary forces. The top of the concrete column and the end of the main truss engage in the fire-protected fire truss. The architectural intention was to expose only those structural elements whose purpose is easily understood. The fire truss is therefore concealed from view because it comes into use in the event of fire.

Blockwork
The blockwork walls supporting the galleries carry only small axial loads because the galleries themselves are so narrow. This makes the upper storeys of these walls sensitive to wind loads. Hollow blockwork with vertical reinforcement has been used for part of the height of the top storey in some places.

Fire scheme
The problem areas were the steel roof structure and the stability of the curtain walling on the north and south elevations.

In considering the roof structure, the main auditorium is essentially a single-storey building with no direct requirement for the fire protection of the roof structure (depending on height). Because of the proximity of adjacent buildings, there was a 1 hr fire-protection requirement for the curtain walls which was obtained by using 12 mm thick Supalux sheets behind the Plannja sheeting on both the internal and external faces. The stability of this type of wall usually depends on the roof structure remaining intact during a fire.

Curtain wall fire integrity

For visual and cost reasons it was felt that neither the main roof trusses nor the technical level steel walkways should have fire protective cladding. Intumescent paints were considered but no agreement could be reached on their use.

The solution eventually adopted uses a fire-protected horizontal truss out of sight just above ceiling level at the north and south ends of the building. This truss has a double function: it prevents the main trusses from collapsing suddenly in a severe fire and it carries windloads.

During normal circumstances, the curtain walls on the north and south elevations rely for their horizontal stability mainly on the technical level steel walkways which have no fire protection. During a severe fire these walkways will soften and will no longer provide horizontal restraint to the curtain walls. In this case, the reduced design wind-loading which is applicable for fire conditions allows the slender curtain walls to span the full height of the building. The fire-protected horizontal truss provides the necessary restraint to the top of the curtain wall, while the moment connection between the horizontal truss and the curtain wall mullions ensures that the truss remains horizontal even when the main truss has fully softened.

Main truss fire failure considerations

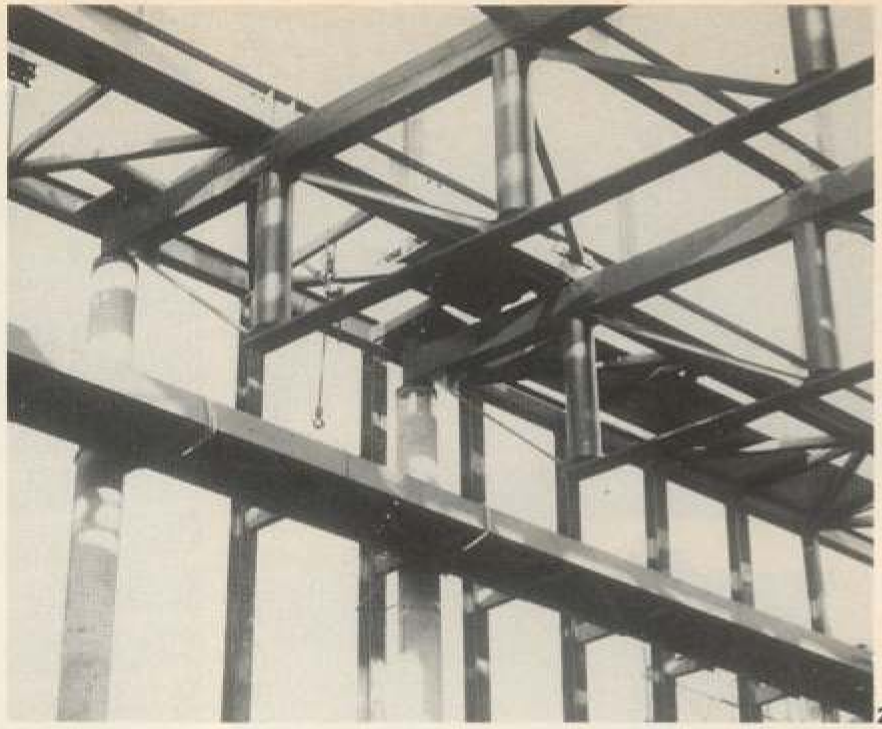
The audience fire escape routes are felt to be completely adequate and the calculated time for a capacity audience to leave the building in the event of a sudden fire is only 1½ min using only the five designated exits and not the four large doors. Nevertheless there was a requirement for the building to remain as safe as possible, even after the audience had left, to allow for the possibly imprudent entry into the building of fire-fighting personnel during or just after a major fire.

In a major fire, the unprotected main trusses will, after a time, soften, sag, and large catenary forces will be developed. To prevent the catenary forces from causing a sudden collapse due to the main trusses breaking free from their vertical supports, the ends of the main trusses are specially anchored to the horizontal truss.

The forces imposed on the horizontal truss when the main truss softens during a fire are in the order of 10 times greater than the wind loading forces, therefore these horizontal trusses could be described as fire trusses.

To reduce the likely magnitude of the catenary forces, some inward movement of the ends of the main truss relative to the horizontal fire truss is desirable. Equally during the initial stages of a fire, the forces due to expansion of the main truss can be reduced by allowing some outward movement of the ends of the main truss relative to the fire truss. During normal day to day conditions the main truss, column head and curtain wall mullions should of course remain rigidly fixed to the horizontal wind or fire truss. (See large scale exploded axonometric drawing.)

The architectural reason for positioning the horizontal truss out of sight was to limit the number of visible structural elements in the roof and to show only those elements whose purpose could be comprehended easily.



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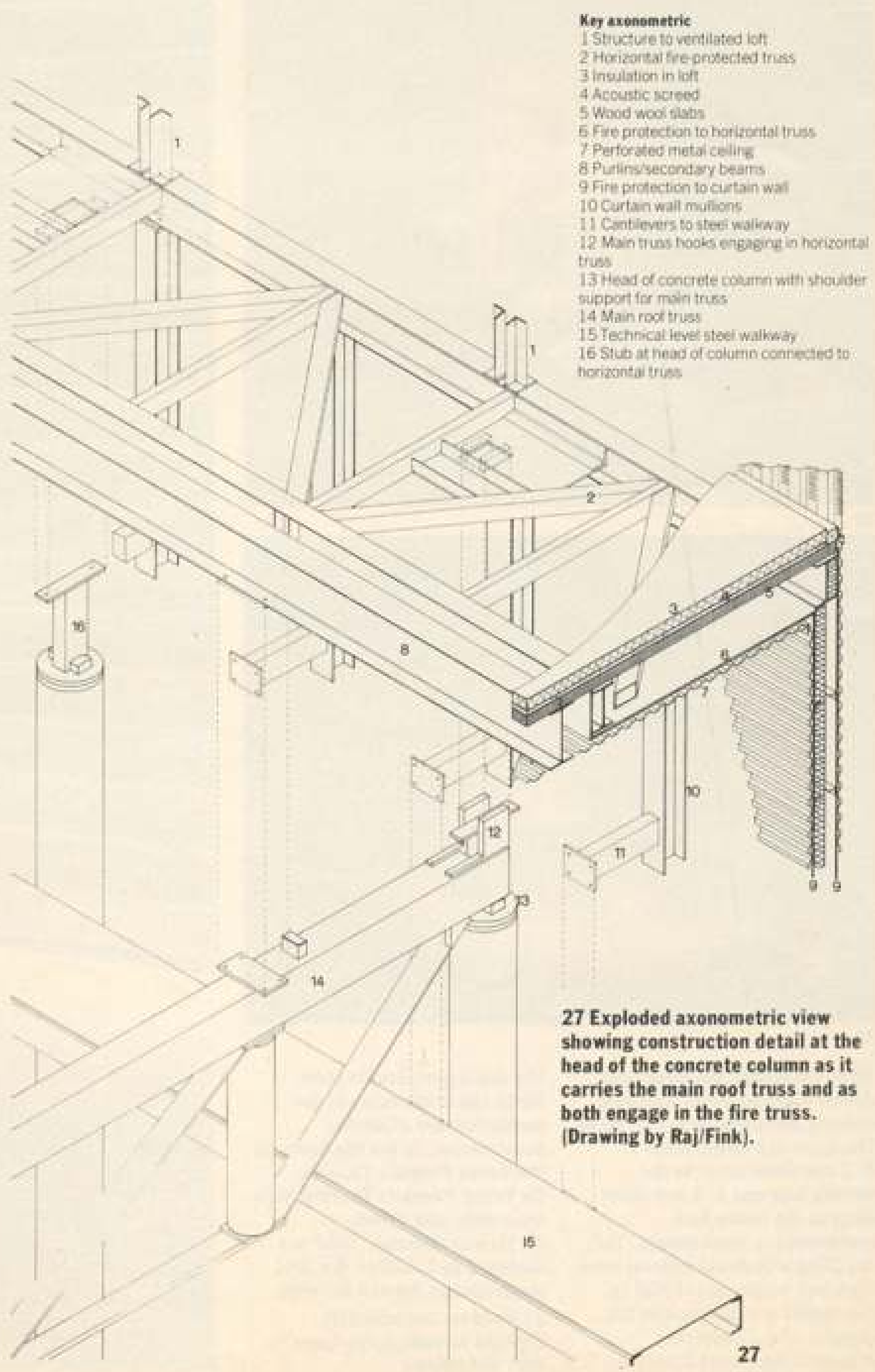

Key axonometric
1 Structure to ventilated loft
2 Horizontal fire-protected truss
3 Insulation in loft
4 Acoustic screed
5 Wood wool slabs
6 Fire protection to horizontal truss
7 Perforated metal ceiling
8 Purlins/secondary beams
9 Fire protection to curtain wall
10 Curtain wall mullions
11 Cantilevers to steel walkway
12 Main truss hooks engaging in horizontal truss
13 Head of concrete column with shoulder support for main truss
14 Main roof truss
15 Technical level steel walkway
16 Stub at head of column connected to horizontal truss

27 Exploded axonometric view showing construction detail at the head of the concrete column as it carries the main roof truss and as both engage in the fire truss. (Drawing by Raj/Fink).

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BUILDING FEATURE

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28 Detail around the large east double acoustic doors. The door opening measures 3·2 × 5·00 m. The doors are constructed of 3·2 mm sheet steel on the outside face and 1·5 mm sheet steel on the inside face spotwelded to steel frames. They are filled with dense mineral wool. Each leaf weighs about 550 kg. The hinges are designed by the supplier of the doors, the Industrial Acoustics Company. The doors have double seals. North and south doors of the auditorium are of similar construction, so are the doors on the Young People's Theatre.
29 Young People's Theatre. View from patio into office.
30 View of 'Sweeney Todd' set designed by E. Cairns, the first production in the new building.
31 Steel curtain wall with daylight screens, large acoustic door and column.

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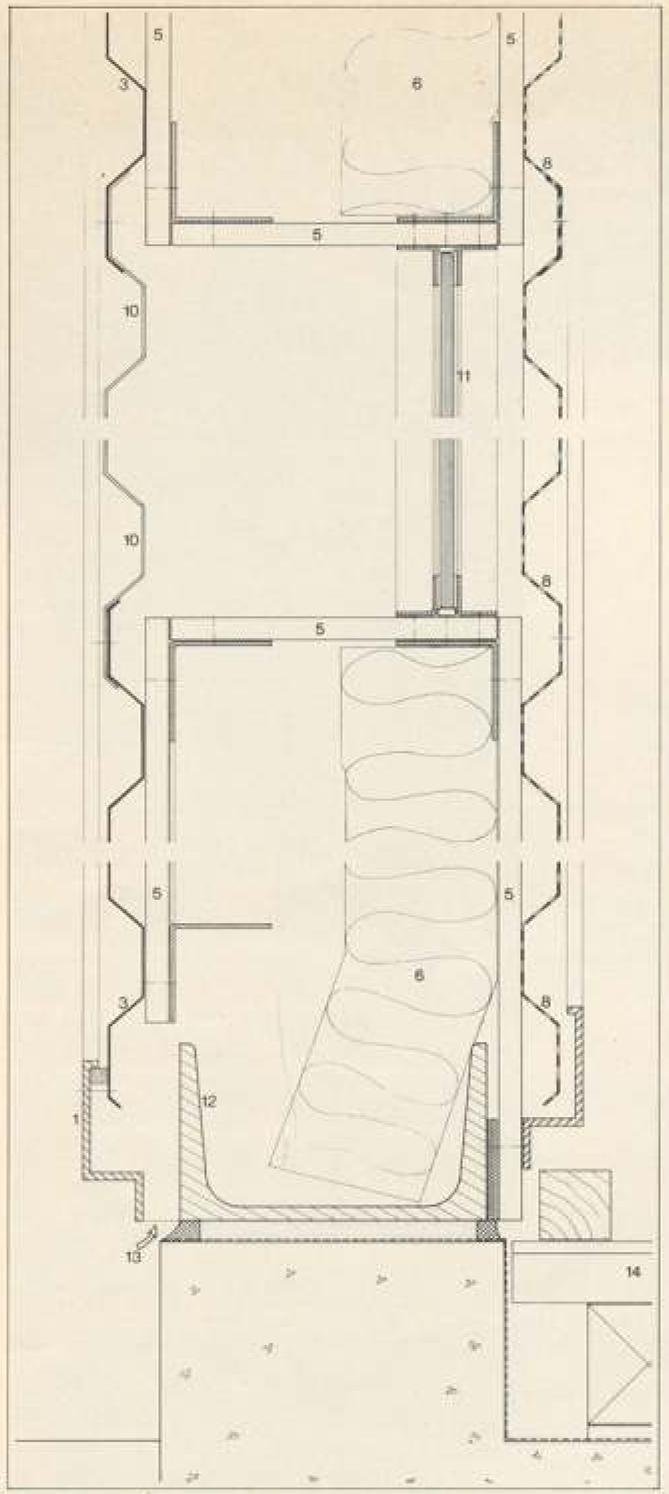
BUILDING FEATURE



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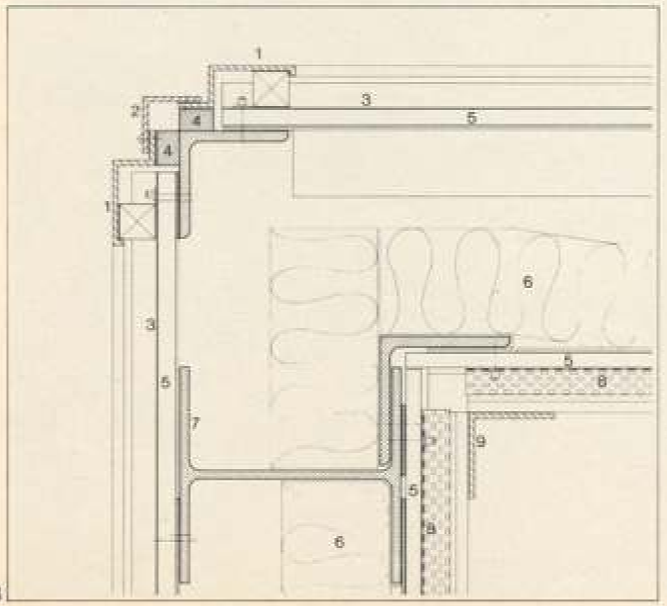
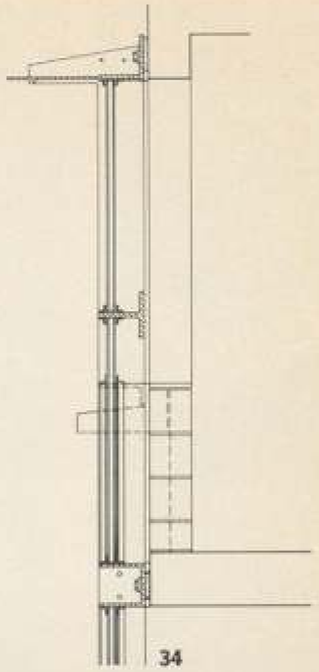


33

32 Vertical section through steel curtain wall with intermittent daylight screens, showing the foot of curtain wall where it meets the floor of the auditorium. The floor is a suspended plywood floor with renewable oil-tempered 6 mm hardboard finish with permanent hard rubber strips to guide resurfacing of the floor with hardboard.
33 Steel curtain wall showing plan of corner detail. The wall is rated to give 1 hr fire protection.
34 Section through Thermascrene glazing of the gate building under construction (see figure 37). The Thermascrene is white and opaque with a light transmission of 60 per cent. It is produced by Solaglass.
35 Stair room to upper galleries.



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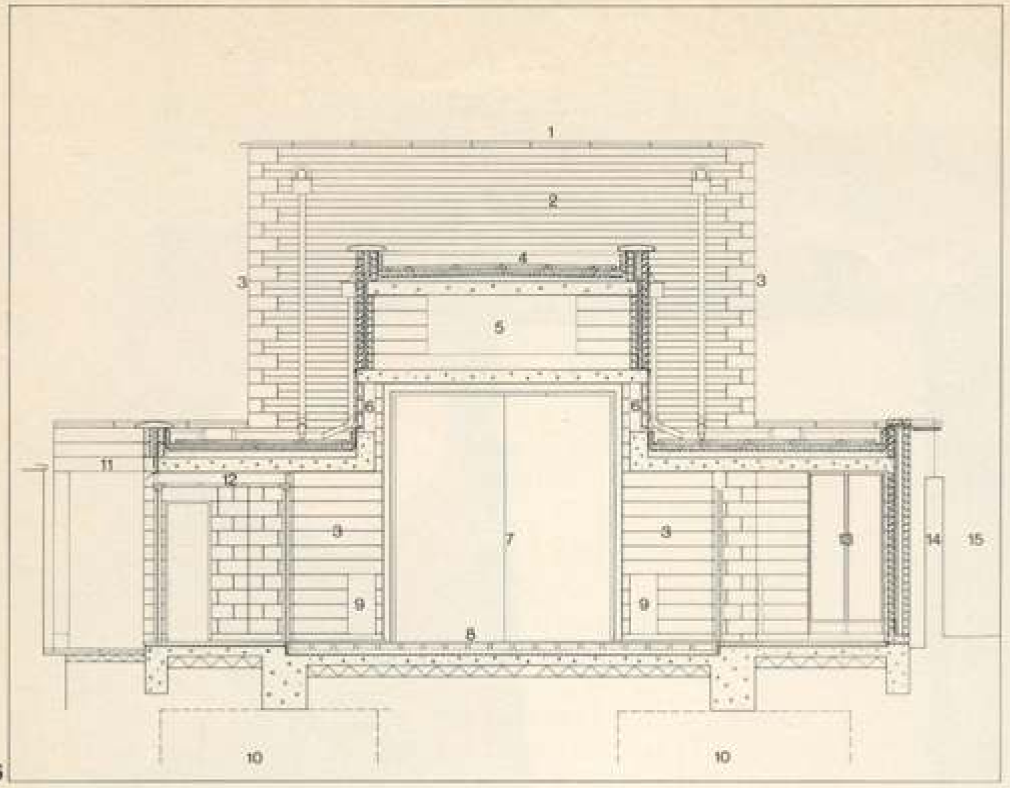
35

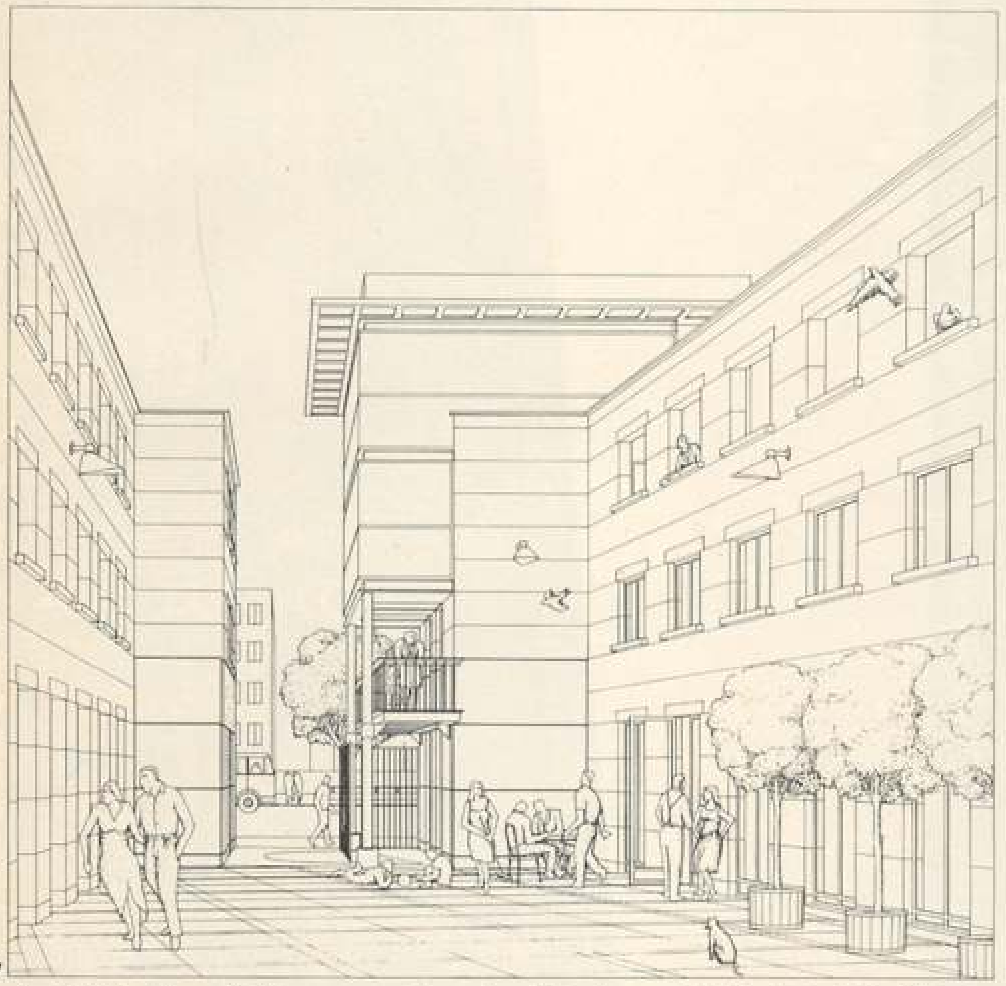
Key to section through steel curtain wall
1 Aluminium bronze anodised trim sections
2 Aluminium bronze anodised angle
3 Plannja TRP20 metal sheeting, PVF$_2$ finish
4 Steel packing
5 12 mm Supalux fire and sound protection
6 Rockwool slabs
7 Curtain wall mullion—one coat of zinc phosphate primer, two coats of high build bitumen paint
8 Plannja perforated TRP20 metal sheeting acrylic finish
9 Aluminium angle stove-enamelled
10 Translucent GRP panel to TRP20 profile
11 6 mm toughened glass for sound insulation
12 Bottom channel to curtain wall (painted as curtain wall mullion)
13 Ventilation to curtain wall
14 Floor construction (see caption)



36

36 Cross-section through Young People's Theatre at the stage end looking towards the main space: the rear elevation is built in brick because it can be seen from the houses behind.

Key to cross-section through Young People's Theatre
1 Precast concrete copings
2 Brickwork
3 Blockwork
4 Inverted roof construction
5 Plant chamber
6 Glass blocks
7 Steel doors to main space
8 Suspended timber floor as in main auditorium
9 Radiator
10 Mass concrete pads
11 Precast concrete lintels
12 Attenuated air inlet
13 W20 sections glass door to patio
14 Cemetery boundary wall
15 Disused cemetery



37

37 View of the public courtyard off Mile End Road, showing the gate building (presently under construction). The architectural intention of the glazing arrangement is to give the upper part of the gate building the appearance of a lantern to the theatre on the Mile End Road (drawn by Chong Huat Tay/H. Welp). See figure 34.

client Half Moon Theatre Building Committee
architects Architecture Bureau: Florian Beigel, Jon Broome, Suresh A'Raj, Peter Rich, Mon Lee, Philip Christou
structural engineers Ove Arup and Partners: Edward Mann, Martin Manning
quantity surveyors Davis, Belfield and Everest: Robert Smith: Jimmy Makomalis
services engineers Robert Matthew, Johnson-Marshall and Partners: Terry Rose
acoustical consultants Bickerdike Allen and Partners: Jon Miller
architectural consultant for handicapped users Environmental Design Partnership: Neil Kirk
theatre consultants Carr and Angier
architectural research Polytechnic of North London, Architectural Geometry Research Unit with Wilfried Wang and the late Ali Nadjafi
site agent Graham Malyon
main contractor C. J. Sims Ltd:
sub contractors: mechanical R. B. Jeffries Ltd, *electrical* T. Clarket & Co, *cladding* Willing & Wooler, *acoustic doors* Industrial Acoustics Company, *doors* Martin Roberts, *glazing* Solaglass Clark Eaton Ltd, *steel* Graham Wood, *glazed windows and doors* John Harris Metal Windows Ltd, *gas radiant heating system* Phoenix Burners Ltd, *steelwork* Bluecane Structures Ltd and Anchor Engineering Company, *glass blocks* Luxcrete.

Architecture Bureau obtained the commission to design the Half Moon Theatre on the basis of a three-stage project is based in a studio of the Polytechnic of North London as part of PNL's policy to serve the local community. Structural and historical research has been undertaken by Architectural geometry research unit, Polytechnic of North London, on an ILEA research fellowship. Students have designed rostra systems and built a full scale mock up of the main space of the Young People's Theatre.