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LONDON'S FIRST REHEARSAL HALL

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Arup Associates were appointed by the London Symphony Orchestra Trust in December 1970 to carry out an assessment of various buildings with a view to their conversion into an Orchestral Rehearsal Hall. Earlier correspondence had also referred to the possible use of the hall as a recording studio and this was considered as an additional need in the assessment.

The search for a suitable building was centred on various churches with good access to the South Bank Concert Halls. Three of the churches were Victorian Gothic Revival buildings: St. Bartholomew's, Battersea: St. Peter's, Battersea and St. Augustine's, Bermondsey. The three Classical churches examined were St. Anne's, Wandsworth: St. George's, Camberwell and Holy Trinity, Southwark.

The building finally chosen for further study was Holy Trinity Church, Trinity Church Square, Southwark. A summary of the findings was presented in a Preliminary Report in March 1971.

During the search for a suitable building, discussions took place with the General Manager, Chairman and Directors of the London Symphony Orchestra, to define a draft brief for the rehearsal hall to help in the assessment. The dimensions of Holy Trinity Church virtually matched this brief.

The immediate appeal of Holy Trinity Church, however, was its position in the quiet and beautiful early nineteenth century Trinity Church Square.

This square, together with the adjoining Merrick Square, was one of the twelve areas selected as a Conservation Area by the London Borough of Southwark under the 1968 Town and Country Planning Act. The two Squares are quite different in size and scale: Merrick Square is intimate in character, whilst Trinity Church Square has a grand and formal air. The square is really completed by Francis Bedford's Classical Revival Church, built in 1824. It had been empty and disused for some years and was the first Church in the South to be declared redundant under the Pastoral Measure of 1968.

The Church is austere in design, its plan being a simple rectangle with a Corinthian portico surmounted by a tower of two stages, with an octagonal lantern above. The exterior is faced with Bath stone and the roofs are covered with copper.

The interior of the Church is plain, with a roof of unbroken span. The bareness of the walls is relieved by a frieze of honeysuckle ornament and by shallow pilasters with honeysuckle ornaments to the head, ranging from floor to ceiling. The pilasters support corbels on which rest the panelled beams dividing the plaster ceiling in fifteen 20 ft. x 20 ft. square coffered bays, each with a ceiling rose in the centre.

There are galleries in the north-east, north-west and south-west sides borne on Greek Doric columns, and above the main gallery on the north-east wall are two small gallery recesses with open balustrades intended for charity children. In 1898, the Chancel was altered and the galleries cut back, and a large area of steps and masonry were added to the altar which still remains. Underpinning beneath the altar was carried out at this time.

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The survey showed that the main structure of Holy Trinity Church was in a stable condition. There were, however, large cracks in the north-east and south-west walls at a position some thirty feet from the south-east end in the centre of the second bay. The cracks ran down through the entire height of the walls and showed on the soffite of the brick arches forming the structure of the ground floor. The brick foundations of the Church were originally built on large timber sleepers and timber piles. The timber sleepers had decayed due to the lowering of the water table over the years. This had caused settlement of the main structure which had been accentuated by the underpinning of the crypt piers carried out in 1898 during the additions to the Altar. Differential settlements had been further aggravated by the construction of brick air-raid shelters within the crypt. In 1967, some thirty glass 'tell-tales' had been placed across various cracks in the walls at ground and crypt level. These 'tell-tales' were very sensitive and, as the majority were unbroken, they indicated that movement of the structure had virtually ceased.

A detailed survey of the building was carried out and the remainder of the fabric was found to be in a very sound condition, especially the roof structure. The copper roof had been wholly replaced under the authority of the War Damage Commission, Some flashings, however, had been displaced and seams opened allowing water to penetrate the building and causing extensive damage to the internal plasterwork. The whole church was in a filthy condition and had for years provided a refuge for wild cats, kestrels and pigeons.

During the preparation of the preliminary report, discussions had indicated a preferred reverberation time of 2.2 seconds in the mid frequencies, with an orchestra of one hundred and twenty spaced for rehearsal. All the recording companies, except one, expressed a preference for an increase in the bass reverberation time. One company specifically requested that the reverberation time at 63 Hz should be 50% greater than the reverberation time measured as an average between 500 Hz and 1000 Hz.

The reverberation time was measured by recording the explosion of four Rank Strand Theatre Maroons and the tapes analysed by Sound Research Laboratories Limited. The average of the reverberation times at 500 Hz was 2.7 seconds, and the average at 1000 Hz was 2.75 seconds. Audience absorption figures suggested by Beranek, BRS Digest No. 30, and those obtained from two Snape Acoustic tests, were used to calculate the reverberation time with an orchestra of one hundred and twenty players. At 500 Hz the calculations indicated the following values: Beranek 1.91 seconds; BRS 2.37 seconds; Snape 2.4 seconds. At 1000 Hz, the values were: Beranek 1.86 seconds, BRS (2000 Hz) 2.26 seconds; Snape 2.39 seconds.

During the search for the 'ideal' building, the various churches were plotted on the 'Noise and Number' contour map included in the 'Action Against Aircraft Noise' published by the Board of Trade in 1969. The site of Holy Trinity Church lay between the 35 and 30 NN/contour. To finally confirm this criterion for the selection of the Church, noise levels were measured and these showed an external ambient noise level ranging between NC 35 and 55. The internal ambient noise level approximated to NC 25.

These visits, discussions and measurements led to the confirmation of a preferred reverberation time of 2.2 seconds in the mid frequencies with an orchestra present. There was nothing more specific from the orchestras other than the request for "a very quiet background". A background noise level of NR 20 was set for the design of acoustic insulation of the main hall and recording rooms and for the design of the mechanical ventilation systems. The recording companies found difficulty in specifying their acoustic requirements in quantitative terms. A wide range of figures were quoted for the acoustic of the listening rooms. Even the BBC engineers and producers did not recommend the figures given for 'Preferred reverberation times of listening rooms' given in the BBC Engineering Division Monograph No. 64, Nov. 1966.

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The first planning application was made in January 1971 and all those involved were stunned by a formal refusal received in April 1971. The reasons given were as follows:

"The proposal would result in the introduction of an inappropriate use into a residential area of outstanding townscape quality that would seriously detract from the amenities of residents by reason of the activity associated with the use".

In addition to these problems with Planning, it was becoming increasingly obvious that the Southwark Diocesan Finance Board and the Church Commissioners preferred the proposals to convert the Church into seven luxury flats with a swimming pool on the site of the Altar.

During 1971 and 1972 a campaign was launched by Press Conference, letters to The Times and private meetings, to reverse these decisions. The Planning Application was resubmitted and received approval in July 1971 and towards the end of 1972 the Church Commissioners finally agreed to the use of Holy Trinity Church as an Orchestral Rehearsal Hall.

Following the final approval of the Church Commissioners, Arup Associates were instructed to prepare designs and documents for the contract. Before this final commitment, however the LPO who were new to the scheme and were, together with the LSO, represented on the newly formed Southwark Rehearsal Hall Trust, suddenly questioned the acoustic of the church, despite all the well documented analysis which had taken place in the previous two years.

Arups were then asked by the Trust to arrange a test concert. In the month before the test concert took place, heavy rain caused failure of large sections of the ceiling plaster. Despite this hazard, the concert took place on Sunday, December 10th 1972 with increased insurance for the instruments and hard hats for the two orchestras. The LSO and LPO played a variety of orchestral music conducted by John Pritchard and Jill Gomez joined them to sing some songs from Ravel's Scheherezade.

The test concert was attended by many people from the musical and recording world and Decca made stereo recordings of the music played and EMI carried out acoustic measurements. With the Church empty and using one third octave band noise, the measurements indicated a reverberation time of 2.88 seconds at 1000 Hz and 2.74 seconds at 500 Hz. With orchestra and some observers present (approximately 140 people) measurements indicated 2.17 seconds at 1000 Hz and 2.25 seconds at 500 Hz. Using an identical maroon to the earlier acoustic tests, measurements indicated a reverberation time of 2.86 seconds at 1000 Hz and 2.77 seconds at 500 Hz. These figures compared well in the middle frequencies with measurements taken in 1971. The test concert wholly confirmed the Trust's view that the conversion should go ahead with all speed.

The Scheme Design Report was published in June 1973, six months after the test concert. This report describes Arups detailed proposals: complete underpinning of the structure, lowering of the crypt floor and, at this level, the planning of a large cafeteria, kitchen, lavatories, showers, cloakroom, libraries, conductors room and air handling plant room. At ground floor level, the main rehearsal space of 60 ft. x 60 ft. with the balcony restructured, and two recording rooms under the north-west balcony. The mechanical ventilation, heating and lighting installations were so designed as to be totally unobtrusive in the classical revival restoration. The whole of the plasterwork was to be restored with traditional fibrous plaster and insitu lime plaster, using the existing lathing wherever possible. It was expected that this, together with cleaning and redecoration, would maintain the mid-frequency reverberation time and also enhance it in the lower and higher frequencies.

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A contract was let in the Autumn of 1973 and the contractor was due to start on October 1st. The building was virtually destroyed by fire on the night of September 30th. The contract proceeded with a new design for the roof and balcony structure. It was fortunate that the whole of the plasterwork had been measured and photographed just before the fire. The whole was replaced with traditional lime plaster but expanded metal was substituted for riven laths in the coffered ceilings. Calculations still indicated a reverberation time of 2.7 seconds in the mid-frequencies. Careful attention was paid to the detailing and installation of the double glazing, doors, roof seals and mechanical ventilation, and in view of recording demands, the standard of NC 15 was set for the main hall and recording rooms.

As the hall approached completion, it was felt by many people to be too live for its volume particularly for rehearsal. The quiet background had been achieved and this, when measured, approximated to NR 17. Against this quiet background, there were various eroneous assumptions about the reverberation time. When measured, it was found to be 2.5 seconds at 500 Hz and 2.4 seconds at 1000 Hz. It was decided to introduce a carpet on to the balcony only, and an extensive curtaining system to give variable acoustics for recording and rehearsal. Measurements carried out by BRE show the following results:

All curtains open	2.2/2.1	seconds at 1000 Hz
Rear curtains closed	2.0	seconds at 1000 Hz
All curtains closed	1.7	seconds at 1000 Hz

There was a slight increase in the bass reverberation time.

The BRE report made the following comments:

"All decays from 500 Hz upwards were extremely good. At other frequencies, there were occasional deviations from perfection, as indicated in the notes to the table. The only significant deviation is probably the double slopes in the 63 Hz octave."

The hall has now been in constant use for three years. Some of the recording companies regret the introduction of the carpet and the general lowering of the reverberation time. There are many and varied opinions about its acoustic. Many musicians and record producers are enthusiastic, especially the pianists. It is perhaps too small for the large orchestral and choral works. It once again demonstrates the problem of producing an acoustic space for such different musical activities as rehearsal and recording and the difficulty which musicians, designers and acousticians find in agreeing an acoustic brief in both qualitative and quantitative terms.