Fig. 3.—Church at Staines.

Fig. 5.—Interior of Church at Staines.

The bell tower is in the form of an open-sided campanile attached to the outer wall. A colonnaded square courtyard, paved with grey concrete slabs, will link the church with the parish hall, which faces the main doorway. The altar is placed almost in the centre of the building, a position that is indicated internally and externally by the high lantern tower and spire. Plain glazing is provided in the lantern tower and coloured glass is provided in the clerestory windows. This is to be replaced eventually by panels of concrete and glass depicting biblical scenes.

The main structure of the building is of cast-insitu reinforced concrete. Where the concrete is exposed on the inside, the finish is left as it came from the formwork. The infilling wall panels are of stock bricks. The load-carrying frame comprises four central columns supporting the roof and lantern, and four Y-shaped frames (*Fig.* 5) along the perimeter of the nave, thus forming a ring of supports to the lower roof, which is of reinforced concrete folded-slab construction and rises to peaks at each corner of the building. The slabs forming this roof are 4 in. thick. The walls of the spire are 2½ in. thick and are of cast-insitu reinforced cellular concrete. The formwork for the inner face of the spire was lined with a compressible joint filter to reduce the risk of shrinkage cracks occurring. The spire is supported by the roof of the lantern tower, which is also of 4-in. folded-slab construction.

The architect is Mr H. Norman Haines, the structural engineers being Messrs E. J. Cook & Co. (Engineers), Ltd. The contractors were Messrs R. F. Herron, Ltd.

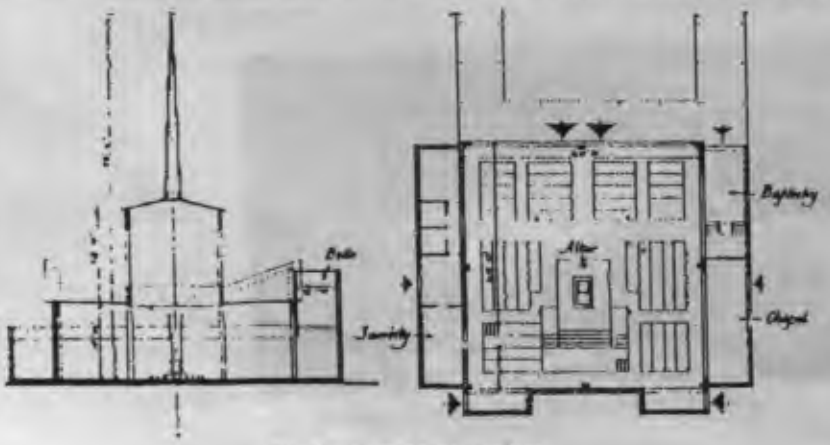

Fig. 4.—Church at Staines.

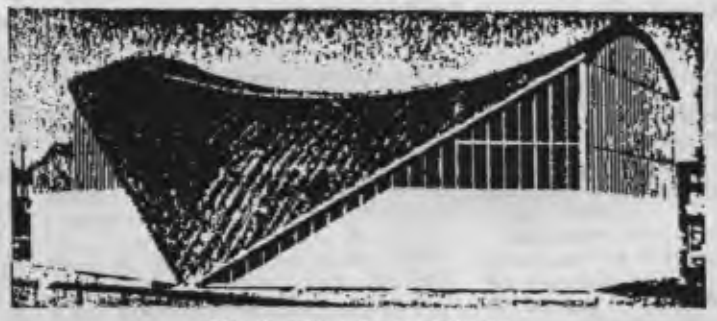

Fig. 6.—Church near Lincoln.

St John's Church, near Lincoln.

A feature of the church (*Fig.* 6) of St John the Baptist, which was completed recently at Ermine, Lincoln, is the reinforced concrete hyperbolic-paraboloidal shell roof, which is hexagonal in plan, the length of the side of the hexagon being 40 ft. The shell is 3 in. thick and, as shown in *Fig.* 7, has two low points at the level of the ground floor from whence it rises to a maximum height of 28 ft. By intersecting the straight generating lines of the hyperbolic-paraboloid at an angle of 120 deg., and by cutting off the top corners of the shell, an hexagon is obtained on plan. Most of the weight of the roof is carried on two reinforced concrete piers below the low points. Steel posts of box-section are provided along the edges of the shell to form also a support for the glazing.

Where the two top corners of the shell are cut off, the edges are parabolic. Ties of Z-section made of 6-in. by 6-in. by ½-in. and 6-in. by 3½-in. by ½-in. steel angles connect the corners of each of the two parabolic edges. The two main piers are connected by a reinforced concrete tie below the ground floor. The thickening of the shell at its edges is 5 ft. 10 in. wide. The thickness increases gradually from 3 in. to a maximum of 10 in. and reduces again to 4 in. at the perimeter of the roof. The maximum thickness is attained 16 in. away from the perimeter.

Timber boards, 4 in. wide and laid parallel to the parabola, connect the two low corners and were used as permanent shuttering for the shell. Two pools are

Fig. 7.—Church near Lincoln: Roof in course of Construction.

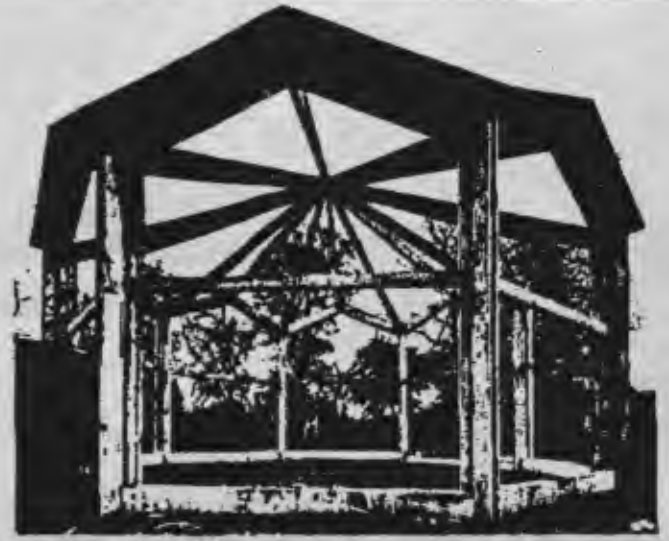

Fig. 8.—Framework of Church at Sale.

provided externally under the low points of the shell to collect the rainwater from the roof.

The cost of the structure was about £10,000. The architects are Messrs Denis Clarke Hall, H. S. Scurer & Roy Bright, the consulting engineer being Dr K. Hajnal-Konyi. The contractors are Messrs W. & J. Simons (Lincoln) Ltd.

Methodist Church, Sale.

The framework (*Fig. 8*) of the new Methodist Church at Sale, Cheshire, comprises prestressed precast reinforced concrete roof members supported on cast-insitu columns which were cast to their full height of 30 ft. in one operation. The total volume of the structure is 30,000 cu. ft., the clear span being 70 ft. The finish is of white cement concrete with blue Shap granite aggregate exposed by bush hammering.

The architects are Messrs Halliday & Agate, and the designers and contractors are Messrs Matthews & Mumby Ltd.

Royal Military Chapel, London.

The Royal Military Chapel at Wellington Barracks, Westminster, is being rebuilt on the same site as the old building, by bombing during World War II. The existing, and relatively undamaged, apse of the original building is incorporated in the new chapel and will be visible, from Birdcage Walk, behind a screen of reinforced concrete columns. The new structure is of cast-finish reinforced concrete frame construction stiffened with panels of brickwork and supporting a roof structure comprising welded lattice steel girders. The building, an illustration of a model of which is shown in *Fig. 9*, is 180 ft. long, 57 ft. wide and 47 ft. high to the eaves. It is founded so far as possible on the existing lime-concrete footings which supported the heavy masonry walls of the original chapel.

Fig. 9.—Royal Military Chapel, London.

This structure, which is being built under the direction of the Secretary of State for War, is now almost complete; the cost will be about £178,000. The architects are Messrs George: Trew: Dunn, and the consulting engineers are Messrs Scott & Wilson, Kirkpatrick & Partners. The contractors are Messrs Dove Brothers Ltd.

St. Mary's Church, Leyland.

The new Roman Catholic church of St Mary's at Leyland, near Preston, Lancs., has a concrete roof (see p. 48) supported only on a peripheral circular colonnade. The overall diameter of the roof is 120 ft. and the height is 40 ft. to the eaves, with an additional 17-ft. rise to the apex of the nave. The roof comprises precast concrete folded slabs supported on prestressed concrete beams which form radial three-hinge arches. Precast concrete Y-shaped columns support a ring-beam at the level of the ambulatory roof, and precast concrete rectangular columns extend thence to the underside of the main roof ring-beam thus forming the colonnade. The cost of the structure, which is expected to be completed in the spring of this year, will be about £50,000, the total cost of the complete building being about £160,000.

The architects are Messrs Weightman & Bullen and the consulting engineers are Messrs Taylor, Whalley & Spyra. The general contractors are Messrs John Turner & Sons Ltd, and the sub-contractor

Concrete Ltd.

Underpinning an old Church.

Work is in progress on the strengthening of the fourteenth-century church at Lamberhurst, Kent. This is the first ancient structure in Great Britain to be so dealt with by the Fondedile process. The underpinning of the nave and aisle is completed and work is now proceeding on the tower.

The church is built of local sandstone, which contains a large proportion of iron. The stone has become weak and is cracked. The walls of the nave lean outwards and, although tie-beams have been provided in the past to secure the roof to the tops of the walls, these means have not been entirely satisfactory. It has not been possible to ring the bells for many years because of the weakening effect this would have on the walls, the stones of which have fractured in places.

Lack of adequate drainage has allowed rain-water to affect the foundations seriously. The underpinning system adopted, which is that developed by Fondedile Foundations Ltd, and is called Pali Radice (root-pattern piles), involves no actual re-building or external excavation and induces the minimum of vibration. Most of the old foundations have been underpinned by 4½-in. diameter piles of this type which are drilled through the foundations and the gravel below into a firm stratum of sandstone. The walls of the nave, which are 3 ft. thick, have been strengthened by inserting steel bars into 1½-in. diameter holes drilled diagonally downwards at intervals of 3 ft. The holes are then filled with cement grout. The existing loose filling within the walls is also consolidated by the injection of cement grout. The tower is to be strengthened similarly.

The Pali Radice system has been used successfully in Italy for strengthening such historical structures as Pienza Cathedral, the Ponte Vecchio in Florence, and the St Andrea delle Fratte church in Rome. The process is smooth and gradual, and the piles, the diameters of which range from 4 in. to 11 in., can be drilled at any angle and to any depth through almost any material.