

# The Canadian Engineer

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### CONSTRUCTIONAL FEATURES OF A LARGE REINFORCED-CONCRETE DOME.

BY L. R. W. ALLISON

The Second Church of Christ Scientist, Los Angeles, California, was recently erected on West Adams Street at a cost of \$300,000, and is probably the finest edifice of its denomination in the west. The structure, shown in Fig. 2, is of reinforced concrete and occupies a ground area of 100 by 150 feet; it was built by a popular subscription building fund. In form it is the arche-type of a Greek cross, offering in treatment many distinctive constructional and architectural features.

The church auditorium proper, 92 by 106 feet, has no column or gallery obstructions, and is surmounted by a hemispherical reinforced concrete dome (Fig. 1) 70 feet in diameter. The crown of the dome is 75 feet above the floor line, and at part way of its periphery, thirty-one stained glass sash are placed to afford an upper source of light.

**Dome Support.**—The supporting structure for the dome, acting as a unit, consists of concrete heavily reinforced with riveted sections. Four columns, as the respective corners of a 70-foot square, carry the load of dome structure and transfer it to the ground. Such columns (Fig. 3) are of concrete section twenty-eight inches square. They are composed of four  $3 \times 3 \times \frac{3}{8}$  inch angles, doubled latticed with  $2\frac{1}{2}$ -inch flats, and at the outside corners for additional reinforcement  $3 \times 3$ -inch T-bars are placed.

At the roof plane of the wings a girder framing is constructed, as shown in plan (Fig. 4). Four large girders "A" form the sides and rest directly upon the columns; at a forty-five degree angle at each corner, smaller built sections "B" are placed, and framing into these latter, as shown, eight small beams "C," approximately 14 feet long, complete a sixteen-sided polygon. This supporting structure is finished flush on top, the smaller girders being carried on brackets, and as a whole sustaining the main base of the dome.

The cross-section (Fig. 5) diagrammatically shows the construction of the main girders "A." The top chord is composed of two  $6 \times 4 \times \frac{3}{8}$  inch angles, placed 12 inches apart and fastened with batten plates. The bottom chord comprises two angles, one  $6 \times 6 \times \frac{3}{8}$  inch and one  $6 \times 4 \times \frac{3}{8}$  inch, similarly spaced and battened. The verticals consist of two  $3 \times 2\frac{1}{2} \times \frac{5}{16}$  inch angles at the outer portion of the truss

and two  $2\frac{1}{2} \times 2 \times \frac{5}{16}$  inch angles at the middle section, while the diagonals are formed of two  $3 \times \frac{5}{16}$  inch bars at outer end and two  $2\frac{1}{2} \times \frac{1}{4}$  inch bars at middle bay, correspondingly. All sections are riveted together at the joints, and the ends of girder riveted to the columns. A system of  $1\frac{1}{2}$ -inch twisted rods for further concrete reinforcing is employed, as will be noticed.

The smaller girders "B" are of like construction, similarly reinforced with twisted rods, and riveted at ends into the main girders. The built beams "C," (Fig. 4) have top and bottom chord each of two  $2\frac{1}{2} \times 2\frac{1}{2} \times \frac{5}{16}$  inch angles, battened 12 inches apart. There are two vertical and three diagonals in each constructed beam, the former consisting of

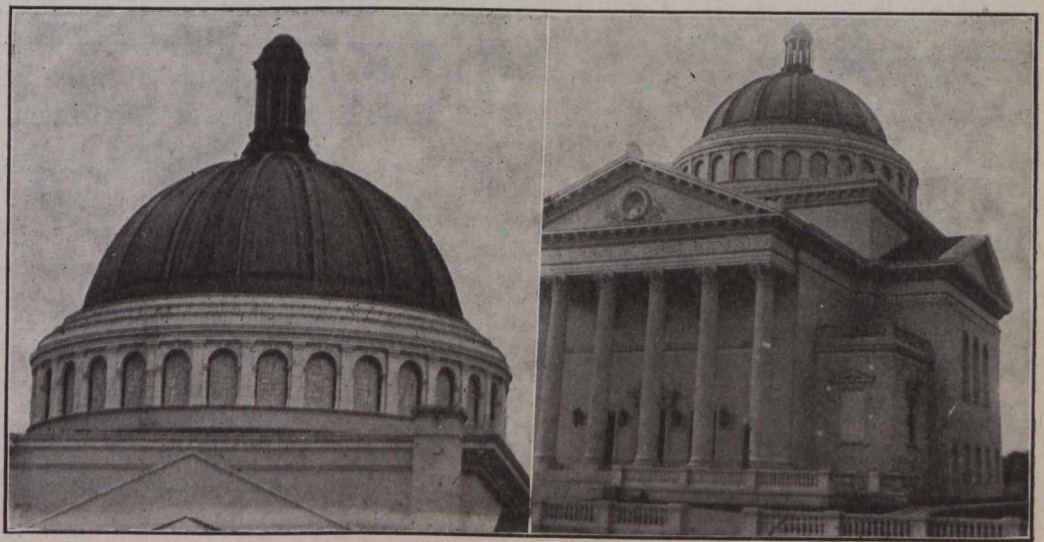


Fig. 1.

Fig. 2.

two  $2\frac{1}{2} \times 2 \times \frac{1}{4}$  inch angles, and the latter two  $2\frac{1}{2} \times \frac{1}{4}$  inch flats.

This steel supporting structure was erected successively, and then concreted as a unit, the timber form work for the latter being supported by the steel frame.

**Dome Construction.**—The forms for the dome were made in sections and located in position as the work progressed. The base of the timber forms rested upon studs concreted in the girder unit for such purpose. For three feet above the riveted section and concrete support, the dome is 16 inches thick, and is reinforced for such distance with two 1-inch bars at the base and six similar bars through the vertical or outer face.

The following section, about 8 feet in height, consists of thirty-two small posts, spaced equally about the circumference to serve for window jambs. These posts, 12 x 14-inch