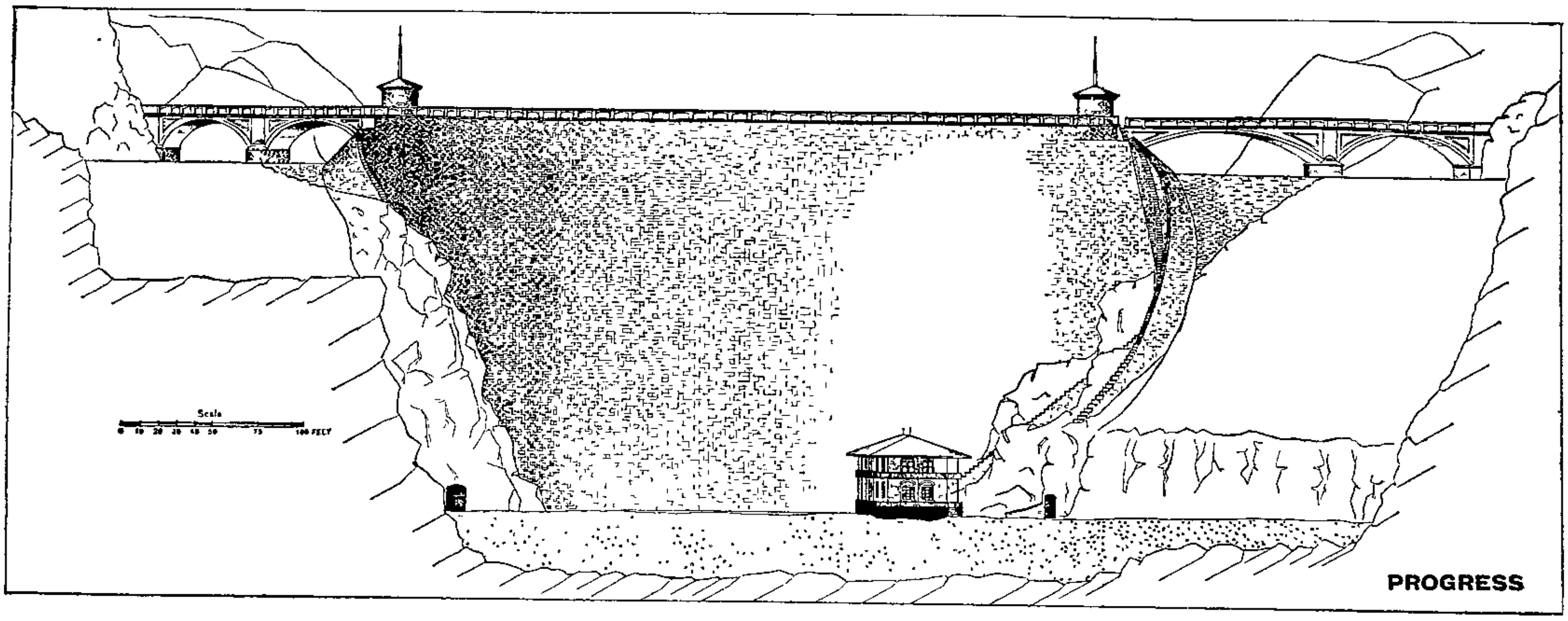


ELEVATION OF SALT RIVER DAM, ARIZONA.

Greatest Dam in the World.

Fifteen years ago the highest dam in existence was the Furens dam (in France), the total height of which was 170 feet. Since then three very much larger dams have been built in the United States. These are the Croton dam in New York, the Clinton waterworks dam at Boston, and the waterworks dam at Denver, on the South Fork of South Platte river. Each of these at present holds the record in one respect or another: the Denver dam is the highest in the world; the Clinton impounds the largest amount of water; and the Croton dam contains the largest mass of masonry. But the Salt river dam, when finished, will exceed each of these in its own speciality; it will be higher than Denver; will exceed the Croton dam in masonry; and will impound twice as much water as all three dams put together. It will be 270 feet high from foundation to parapet, will contain 300,000 cubic yards of masonry, and will impound more than a million acre-feet of water—that is, more than enough to cover a million acres (1,500 square miles) to a depth of one foot. It will form a lake 25 miles long and one to two miles wide, covering an area of 14,000 acres. Its cost, with maintenance for ten years, will be about £800,000.

The dam will be thrown across a gorge—300,000 cubic yards of solid masonry, to be laid in Portland-cement mortar in a wedge-shaped section, 16 feet wide at top and 165 feet wide at bottom. It will tower 230 feet above the level of the present river bed, and penetrate 40 feet beneath it, giving it a total height of 270 feet. Two gigantic spillways, each 100 feet wide, sunk 20 feet below the crest of the dam, will provide an outlet for floods too great to be risked against the main body of the dam. When fully opened, these spillways will discharge 10,000 cubic feet of water per second—an enormous flow, but none too great, for these arid-land rivers, when they come down in their might, rival even the Mississippi in their volume. In 1891 Salt river discharged for a few days the almost incredible amount of 300,000 cubic feet per second—enough to fill the entire reservoir in one day. Only about half of this, however, came from the watershed behind the Salt river reservoir, the other half coming from tributaries entering below the dam site.

The reservoir behind the dam extends up both Salt river and Tonto creek, and can be made to hold almost any amount of water that is desired. Exhaustive surveys were made to determine its capacity, as few things are so deceptive to the eye as the area of a reservoir before it is filled.

The three power sites of the Salt river project are expected to develop power, which, when transmitted by electric cable to the proper places, will pump enough to irrigate some 50,000 acres of land. This, with 150,000, or more, acres supplied direct from the stored water behind the great dam, will make up the entire irrigable land of the Salt river project—an area equivalent to one-third of that of the entire state of Rhode Island.

We are indebted to the *Technical World Magazine* for the illustrations of this great undertaking.

The Trinity House authorities are placing a new foghorn signal at the Needles Lighthouse. It is a reed trumpet worked by compressed air, and will be heard eight or ten miles from the lighthouse.

Hollow-Concrete Block Construction.

By Spencer B. Newberry.

FIRST PAPER.

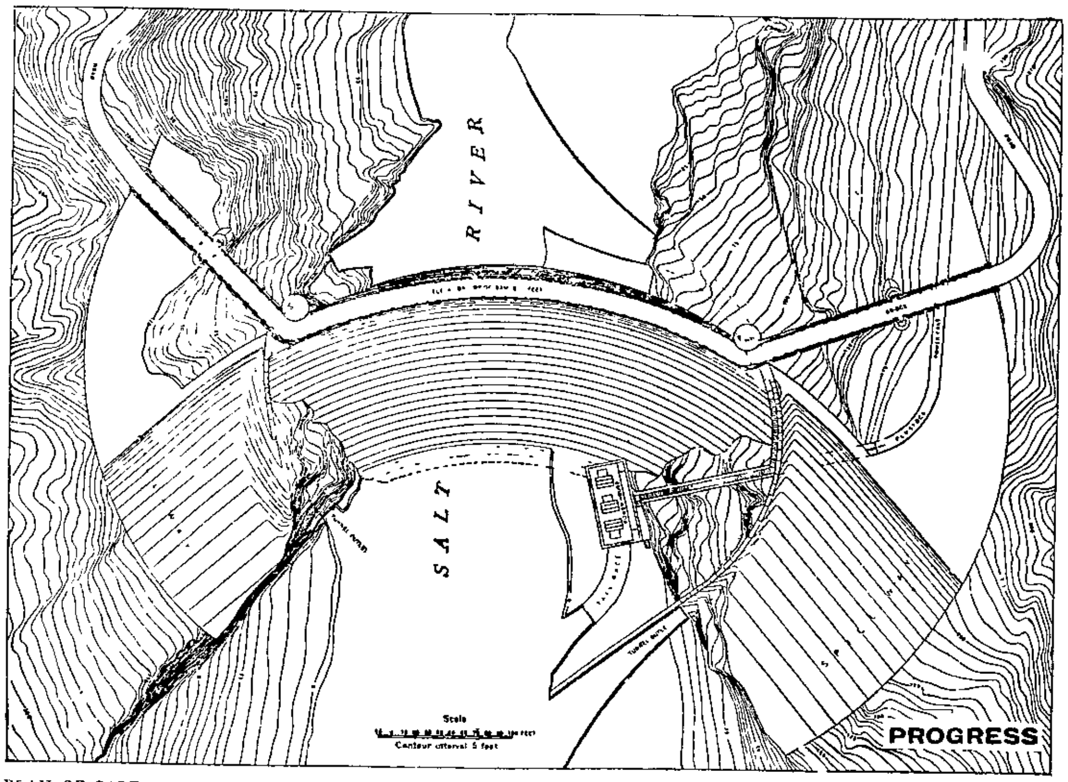
Historical.—The use of concrete for building construction dates back to the time of the Romans. Though their only cement was a mixture of volcanic scoria with slaked lime, they showed a degree of skill and boldness in the moulding of walls, arches and domes which is scarcely equalled at the present day, and many of their structures still stand as striking examples of the everlasting qualities of artificial stone.

The moulding of concrete into separate blocks, to be used for building in the same manner as brick or blocks of stone, appears first to have been introduced in the early part of the 19th century. Solid blocks were first made, but proved heavy to handle and found but scanty use. Hollow blocks to be used as such or filled up with concrete after placing in the walls, were patented by Sellars, in England, in 1875. Concrete facing slabs, with projections to secure them to the concrete filling, soon followed, and in 1878 Listh, of Newcastle, patented a very ingenious Z-shaped block. All accounts indicate that these blocks were made by pouring wet concrete, and allowed to harden many hours before removing the moulds, a somewhat costly and tedious process.

The modern rapid method of moulding hollow-concrete blocks, from semi-wet mixtures of such consistency as to permit immediate removal from the machine, is an American invention, and has been gradually developed during the past six years. By the use of this process the manufacture of blocks has been greatly simplified and cheapened.

Materials.—Portland cement, owing to its uniformity, strength, and especially its promptness in hardening, is the only hydraulic material which finds any considerable use in block-making. A great point in favour of Portland cement is that it gains at least as great strength in the air as in water; other hydraulic cements are generally unsuitable for work not kept permanently wet. At the present moderate price of Portland it is certainly cheaper in use, for a given strength, than any of its substitutes. The "aggregate" or inert coarse material used with cement to produce concrete blocks, may be either sand and gravel or stone screenings. There is little choice between these two classes of material, if of good quality. Sand and gravel are generally cheaper, and are usually somewhat easier to perfectly mix with the cement. In the matter of strength and hardness of the resulting blocks there appears to be little or no difference.

The strength of concrete depends greatly on the density of the mixture, and this is chiefly a question of voids in the aggregate used. It is well known that a mixture of cement and sand is weaker than the same mixture with the addition of coarse gravel. For example, a mixture of cement 1, sand 3, will show a lower strength than cement 1, sand 3 and gravel 4, though the latter mixture contains only half as much cement as the former. This is due to the reduction of the voids in the mass by the addition of coarse gravel.



PLAN OF SALT RIVER DAM, SHOWING THE LOCATION OF THE POWER HOUSE, POWER CANAL TAIL RACE AND CONTOUR OF THE RIVER BANKS.