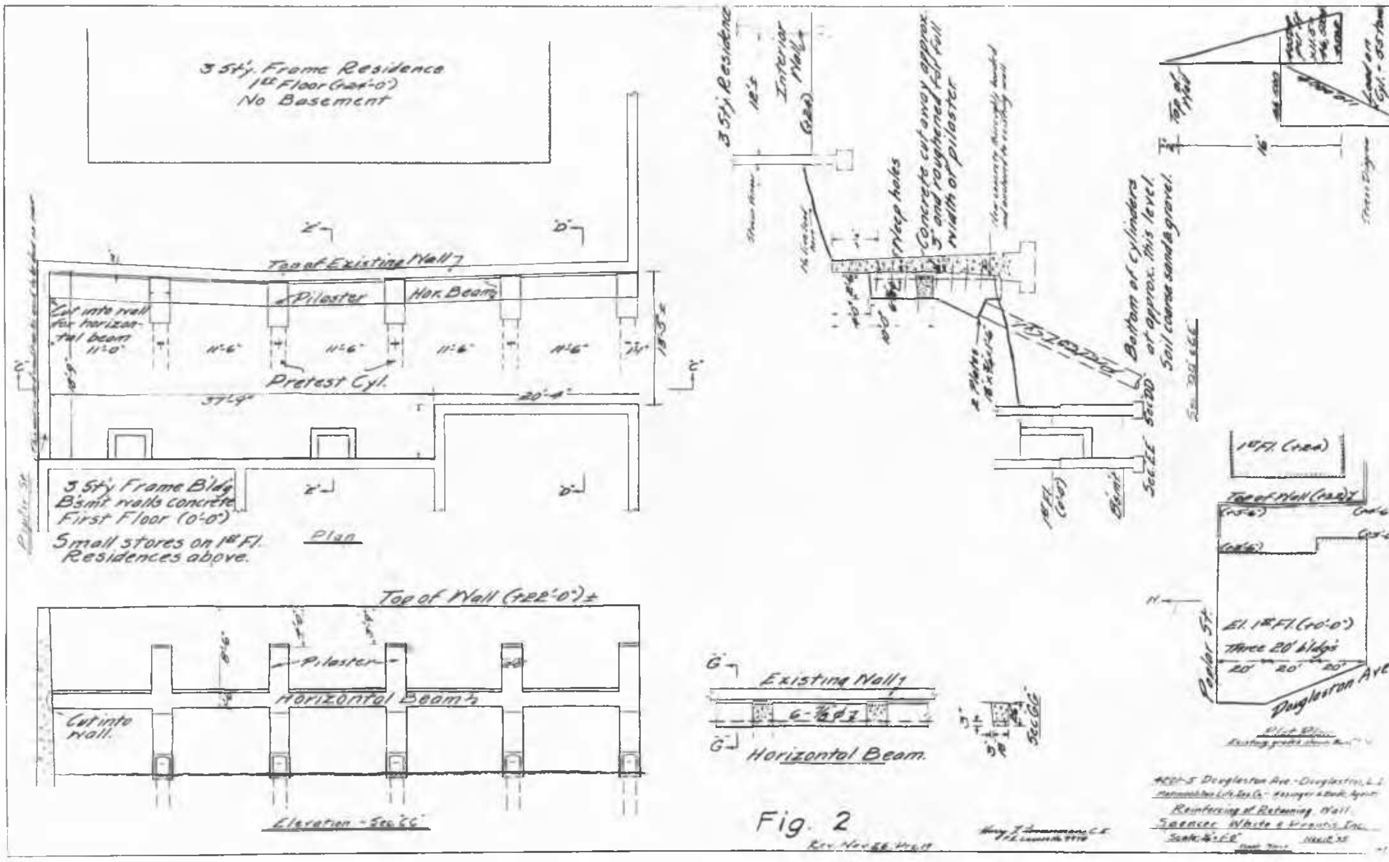


well as to reinforce the wall between the points of application of the cylinder reactions. In order to provide resistance to uplift of the grillage system, the portions of the wall in contact with the vertical supports were roughened, and dowels placed as shown in Fig. 2.

It was estimated that a loading of 55 tons on each cylinder would provide reaction sufficient to prevent further movement of the wall. After the concrete of the grillage system had obtained final set, the PRETEST Cylinders were installed open-ended in sections approximately 2 feet long, connected by internal sleeve couplings; the cylinders were 15" in diameter with walls 5/16" in thickness. They were installed by means of hydraulic pumps and rams, the grillage system and existing wall providing the necessary reaction. The material from within the cylinders was excavated by means of special tools designed for that purpose. When inspection of the material removed from within a cylinder and the hydraulic pressure required for penetration indicated that a stratum of sufficient bearing capacity had been reached, the cylinder was filled with 1-2-4 concrete; after this concrete had set, the hydraulic equipment was again installed, the cylinder tested to an overload capacity, and wedged in place by the PRETEST process, which maintains the full test load upon the cylinder until the completion of the wedging. Each cylinder was tested to at least 70 tons, and penetrated to approximately the depth shown on Fig. 2.

Fig. 3 is a view of the completed structure showing the inclined cylinders and the wedging beams. Fig. 4 is another view of the completed structure looking in the opposite direction and shows one of the large cracks in the wall.

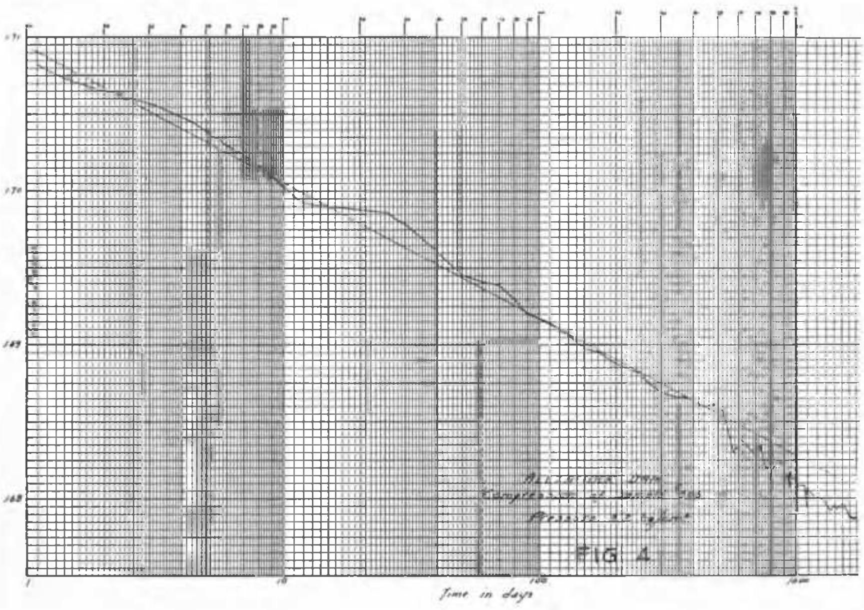
The reinforcing of the wall was designed and installed by Spencer, White and Prentis, Engineers and Contractors, of New York City.

No. Z-12 THE ALEXANDER DAM. SOIL STUDIES AND SETTLEMENT OBSERVATIONS

Joel B. Cox, Civil Engineer, McBryde Sugar Co., Ltd., Hawaii

The Alexander dam was built during the period 1928 to 1932 using the well decomposed residual soil resulting from the decomposition of basaltic flows and ash beds. This soil is a laterite quite typical of Hawaiian soils formed under moist upland conditions. It is characterized by high colloidal content and a very expanded structure with high voids-ratio. It is especially cohesive and slippery. The shoulders were of necessity built of the same materials, the coarser portion being retained in the beach or shoulder area during the process of construction by the hydraulic method.

A serious slide during construction appeared to be caused by the failure of shoulders to maintain



their open structure under compression and a failure to drain properly when consolidated by compression. The final completion of the dam was therefore accomplished by the provision of an extensive tile drainage system throughout the downstream beach or shoulder section of the dam, Fig. 1 and 2. With this provision no difficulty was experienced in completing the dam to its full height of 128 feet above the ground surface under the centerline. Its performance since completion has been entirely satisfactory with a settlement somewhat less than computed by the consolidation curve of the core, Fig. 3.

In connection with the core consolidation studies we are continuing a long-time consolidation test on a representative sample, as shown in Fig. 4.

During construction of the dam more than one hundred soil samples were subjected to a complete analysis, including determination of consolidation characteristics, Atterberg Limits, grain size distribution, etc.

No. Z-13

EXPERIMENTS WITH MODELS FOR DETERMINING THE DEFORMATION AND TENSIONS IN FOUNDATIONS ON PLASTIC GROUND

Ing. Ad. Pogany, Krakaw, Poland

When designing foundations we often make arbitrary assumptions on stress distribution which simplify the calculation of stresses, but may have nothing in common with reality. It is true that some American, German and Swedish investigators have carried on practical and theoretical studies of the mechanics of soils. Nevertheless in my opinion there have as yet been no suitable and systematic investigations of the joint action of the building ground and foundation, or of the stress distribution caused by the phenomena of settling of the building and the relation of the settling to the deformation of the foundations.

The correct determination of stress distribution requires a method which (1) is not excessively costly, i.e. which does not demand any particular outlay for equipment; (2) can be easily adopted everywhere, not only in a specially equipped laboratory, but also on the building site; (3) can give sufficiently useful results for a practical design.

In my investigations I have studied the deformations of plastic soils by means of models, in which the soil is replaced by another plastic mass with different physical properties. The actual magnitude of the deformations in the soil under a foundation cannot be determined by experimenting with models. However, the experiment with a model serves principally to determine the pressure distribution, or the assumptions of the deformation for a system of foundations, and for this purpose it is not indispensable to know the exact physical soil constants.

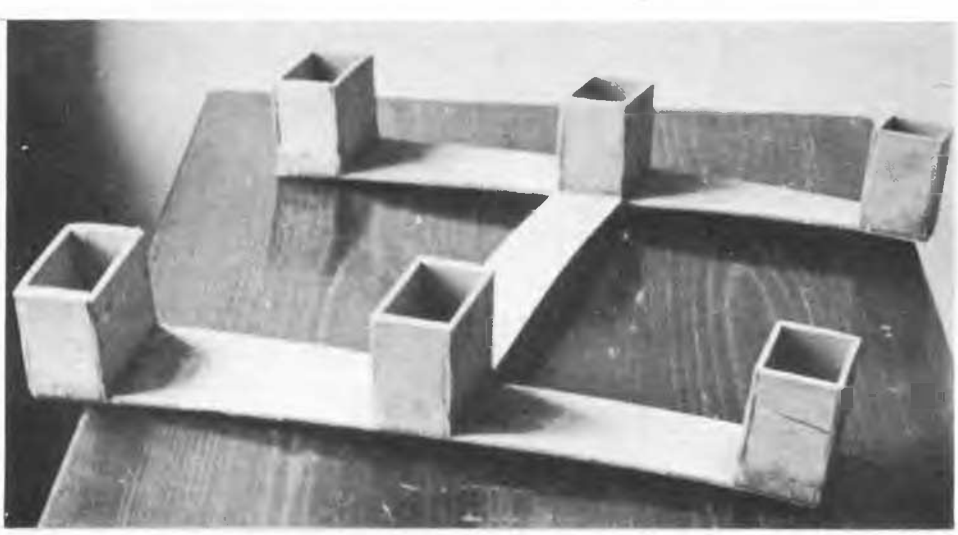


Fig. 1

The plastic masses used in the tests, freshly made mortar with gypsum, mortar with cement and concrete with sand, harden after subsequently setting and the pictures of the deformation can easily be examined in these hardened

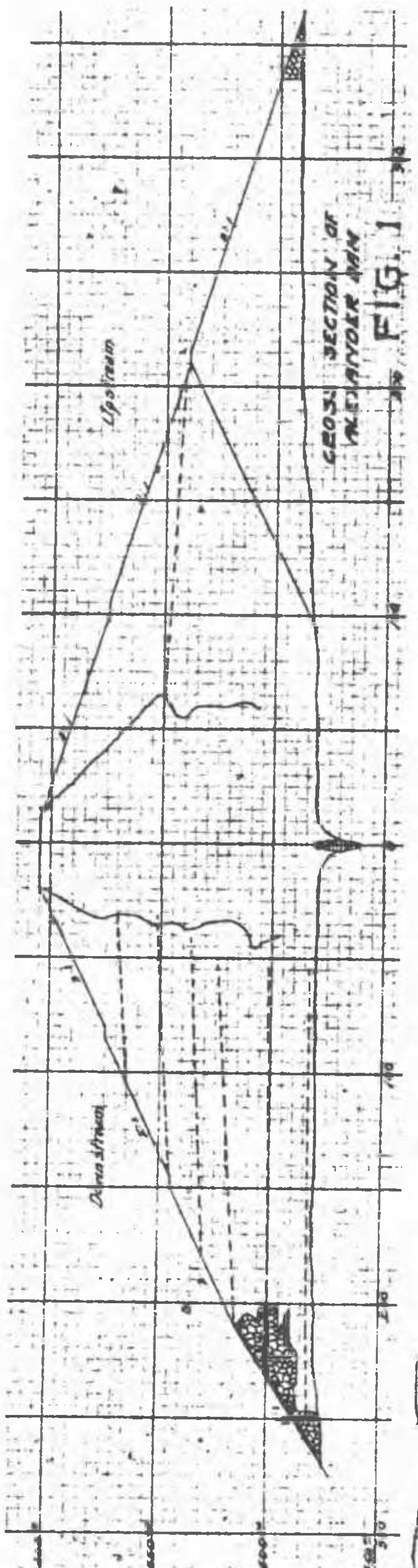


FIG. 1

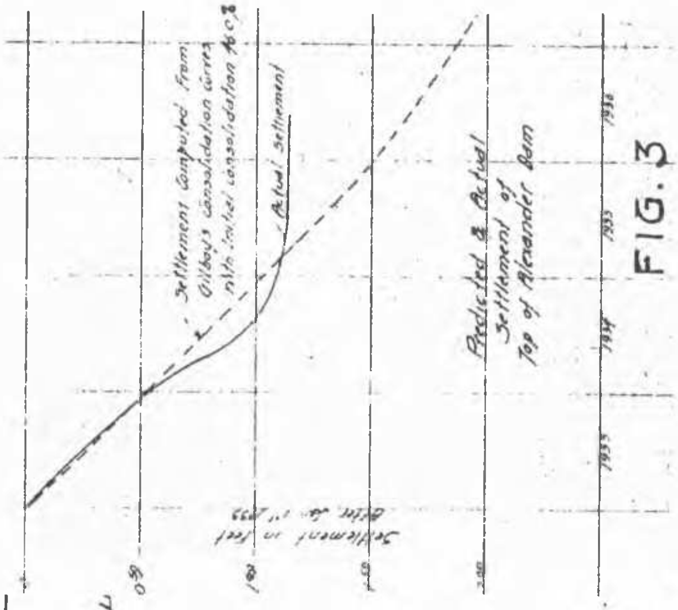


FIG. 3

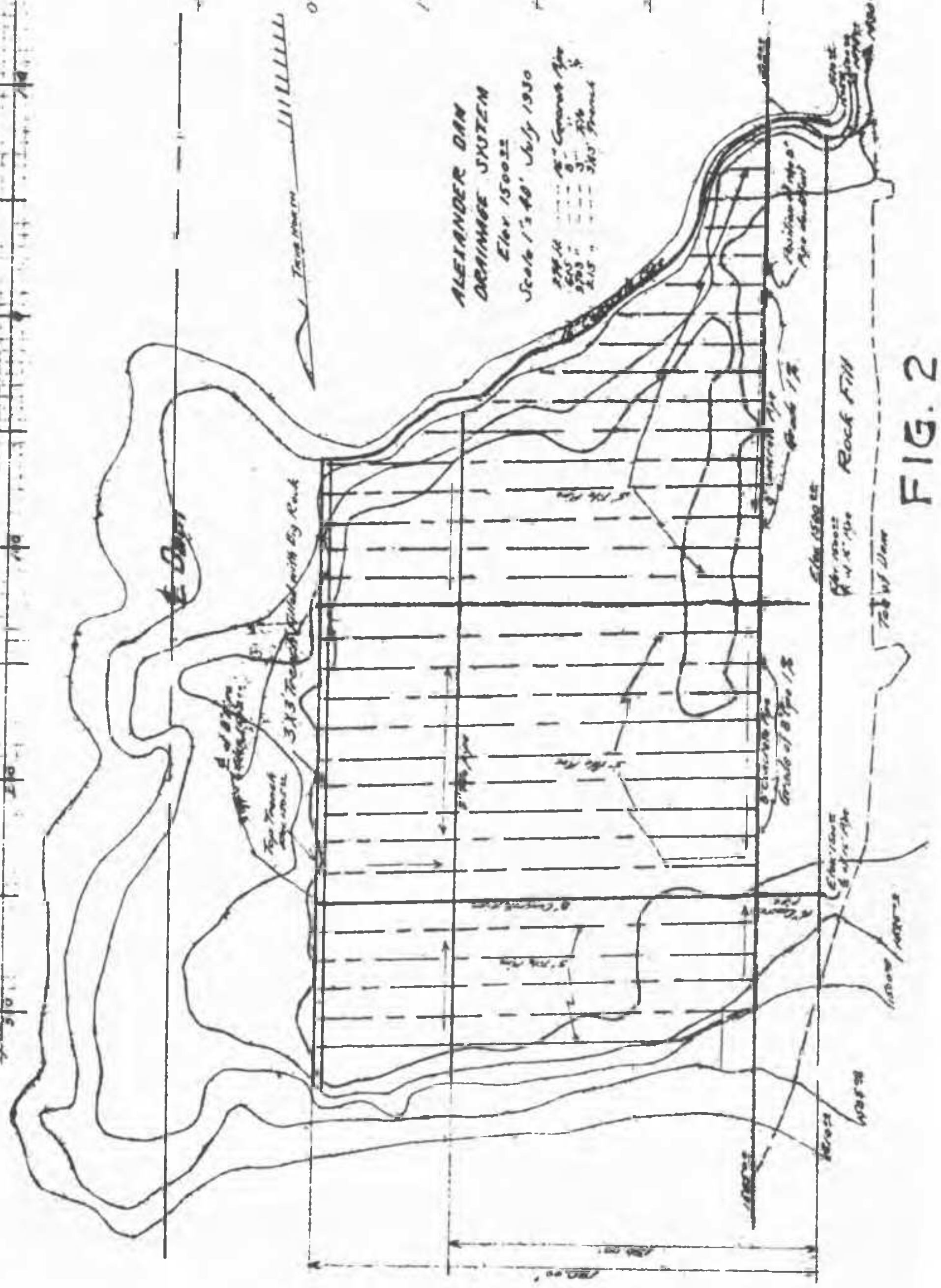


FIG. 2