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SELECTED ABSTRACTS ON ENGINEERING GEOLOGY AND RELATED SUBJECTS

By

Severine H. Britt

UNITED STATES DEPARTMENT OF THE INTERIOR

Oscar L. Chapman, Secretary

GEOLOGICAL SURVEY

W. E. Wrather, Director

Washington, D. C.

Free on application to the Geological Survey, Washington 25, D. C.

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CONTENTS

INTRODUCTION

The following 84 abstracts are a selection from a much larger number of abstracts recently prepared for use within the Geological Survey. The selection is meant to represent material that is not generally brought to the attention of geologists directly and, for the most part, may not find its way into English-language abstracts normally consulted by American geologists. All but four of the abstracts deal with subjects outside the United States; 35 are originals, 26 are based on translations of abstracts in foreign languages, and 19 are adapted from English-language abstracts of foreign material. A few of the abstracts bear a notation that complete translations have been prepared. Abstracts followed by the initials D. J. V. and H. V., respectively, are by David J. Varnes and Helen Varnes; all others, except authors' abstracts, are by the writer. Where dates of publication are not shown, they are unknown to this writer.

The coverage, of necessity, is far from complete, but the writer hopes that the abstracts will indicate the wide range of work going on abroad and will further stimulate the interest of American geologists. It is expected that, in the future, similar selections will be published as the need may arise.

CONSTRUCTION MATERIALS

Ariano, R. I materiali stradali [Road materials], Milano, Editions Gorlich.

This book deals in a very up-to-date manner with three main subjects: soils, aggregates, and binding materials. (1) The study of soils include classical tests and investigation, foundation, and stabilization methods. (2) The aggregates are treated so as to enhance the value of procedures that facilitate their classification according to their qualities as road materials. (3) The subject of hydraulic binders is largely developed. Two particularly informative chapters refer to emulsions and asphalts. The question of asphalts has been thoroughly studied in Italy, and original solutions have been found that have proved successful.--Translated and adapted from a review in Génie civil, tome 76, no. 9, May 1949. Date of publication and number of pages not given.

Buisson, Maurice. Les pierres. Etude de leurs propriétés liées à la présence et à la circulation de l'eau dans les pores [Study of stone properties in connection with the prensence and movement of pore water]: Centre Sci. Tech. du Bâtiment Cahier C7, 16 pp., fig., Paris, July 1948.

This is a study of the properties of stones with regard to the presence of water in the pores. Included are generalities based on the law of capillarity; manifestation of capillary pressure in stones; compression of stones by capillary pressure; direct determination of capillary pressure; indirect method for the determination of capillary movement; test proposed by the project of norm and its discussion; study of the experimental verification of the independence of capillarity and the hygrometric state and influence of evaporation on the measurements; capillarity of some building materials; influence of quarry water or partial absorption on the capillarity value; swelling pressure; and conclusion as to the methods of capillarity tests.--Based on a translation of abstract 89-21, Documentation technique des Annales de l'Institut Technique du Bâtiment et des Travaux Publics, Paris, Jan. 1949.

Denissov, N. J. Process of gravitational consolidation of argillaceous rocks as affected by their cohesiveness: Acad. sci. U.R.S.S. Comptes rendus [Doklady], vol. 55, no. 5, pp. 429-432, 1947.

It has been shown that recent deposits of argillaceous sediments constantly under water have a low density, in the neighborhood of 1.3 grams per cubic centimeter. It is also observed that if these fluid sediments are subsequently covered by coarse-grained materials the boundaries between the clay and gravel are generally sharp, indicating that the particles of overlying material did not sink into the muds. From this it must be concluded that cohesion and structure are characteristic to a certain extent of argillaceous sediments extracted from under water results from destruction of cohesion between particles by the sampling process.

It is characteristic of the initial state of formation of argillaceous rocks that those formed in water are less compact and more compressible than those formed subaerially.

The optimal conditions of consolidation for water deposits occur when the particles are enveloped by colloidal films reducing friction, when cohesion is low and during high rates of sediment accumulation. Pessimal conditions of consolidation will be determined by the maximum effect of electrolytes that increase friction and cohesion between particles, by the slow rise of compacting pressure, due to low rates of sediment accumulation, and by interruptions in sediment accumulation.

For subaerial deposits the optimal conditions of consolidation will be determined by the constant influence of moisture and the absence of cohesion; the pessimal, by compacting in the dry state.--D.J.V.

Duriez, ... Les gravillons routiers. Résistance à l attrition et à la fragmentation par choc [Road gravel. Resistance to attrition and to fracture under impact]: Rev. gén. des routes, no. 198, pp. 13-16, July 1948.

This paper consists of generalities on road tests; discussion of abrasion and impact tests of crushed gravel for road material; general study of the coefficient of resistance to abrasion (Deval), of the coefficient of fracture under impact (Amédée Mannheim) for crushed gravel, and of the relation between these two coefficients; statistic study of the resistance to abrasion and to impact of road gravel of the same mineralogic nature; considerations regarding the selection or elimination of crushed gravel for road material; special study of rolled gravel from dredging; conclusions.

Frye, J. C., Plummer, Norman, Russel, T., Runnels, ..., and Hladik, William. Ceramic utilization of northern Kansas Pleistocene loesses and fossil soils. Kansas Geol. Survey Bull. 82, pt. 3, 124 pp., 3 pls., 10 figs., 7 tables, bibl., 1949.

Late Pleistocene loesses, classed as Loveland, Peoria, and Bignell silt members of the Sanborn formation, and their contained fossil soils (Loveland and Brady) constitute the most widespread ceramic raw material in Kansas. The silt deposits were made by the action of winds on stream-borne sediments during intervals of northern and mountain glaciation. The silts were modified by weathering processes that produced deep soils on former upper surfaces now buried by younger deposits. These silts and soils were sampled at 46 locations extending from the Missouri River on the east to the Colorado State-line. Ceramic tests on 318 samples and chemical analyses of 52 samples are reported. Spectrographic analyses supplement the ceramic and chemical data. The data show a high degree of uniformity from east to west, but the greater effect of weathering in the eastern part of the state has increased the clay content and plastic properties. The Loveland is especially suitable for manufacture of brick, tile, and light-weight ceramic aggregates. The Peoria silt (exclusive of the Brady soil) is suitable for manufracture of dense "ceramic slag." At many localities the entire thickness of the Sanborn formation, including the fossil soils, may be utilized as raw material for brick, tile, and both light and heavy ceramic aggregates.--Authors' abstract.

Hagerman, T. H. Om svenska bergarter och deras provning för konstruktionsandamal [On Swedish rock types and tests for structural purposes]: Statens Provningsanstalts Meddelande 85, 181, pp., 73 figs., 12 tables, bibl., Stockholm, 1945. Price, Kr. 5.

Communication 85 of the State Testing Laboratory (Statens Provningsanstalt) has the following contents: Forward. (1) Classification of kinds of rock (eruptive, sedimentary, metamorphic). (2) Properties of rock (chemical composition, mineral composition, specific gravity, color, structure, density and pore ratio, homogeneity, other properties). (3) Quarrying and working. (4) Different uses of rock and desirable properties for different purposes; foundation stone, stone for load bearing, facing stone, stone for bridges and harbor works, etc.; stone for air-raid shelters; stone for outdoor flights of steps, paving, and curbs; thin stone slabs for facing and roof covering; stone for stairs and flooring; stone for internal walls and seats indoors; stone for sculpture, monuments, etc.; stone sets and stone for paving; crushed stone. (5) Determining the technical properties of unworked stone (open-pore ratio, capillarity, permeability to water and air, water absorption); weathering, durability of surface appearance and color; insulation and transmissivity in respect to heat, electricity, and sound; behavior of stone at high temperatures; elasticity and strength; static loading tests; dynamic loading tests; hardness and abrasion resistance; taking rock specimens. (6) Determining the technical properties of worked stone (tests of crushed stone, tests of natural stone slabs, tests of stone sets). (7) Summary of some results of tests. Concluding remarks.--Adapted from Building Science Abstracts, new ser., vol. 20, no. 8, Aug. 1947 (abstract 994).

Kerr, P. F., and Kulp, J. L. Reference clay localities, United States; Am. Petroleum Inst. Project 49, Preliminary Rept. 2, Clay Mineral Standards, 101 pp., New York, Columbia University, Feb. 1949.

This is a list of clay localities in the United States. The clay minerals included are chiefly those of the kaolin, montmorillonite, and hydromica groups. Location, geological data, samples collected, and references are given for each item. The text is illustrated by 38 maps and 29 photographs.

Patton, J. B. Crushed stone in Indiana: Dept. Cons., Geology Div., Progress Rept. 3, 47 pp., Bloomington, Apr. 1949.

The author describes and locates limestone formations quarried in southern and northern Indiana. A list of 92 crushed-stone quarries is given with their location, date of field examination, geologic formation, and products. A table shows the results of analyses of limestones quarried in Indiana, and the text is accompanied by a bibliography and a map showing the quarries producing crushed stone.

Phemister, J., Guppy, E. M., Marwick, A. H. D., and Shergold, F. A., Roadstone; Geological aspects and physical tests: Dept. Sci. Ind. Research [Great Britain] Road Research Bull. 3, 42 pp., 1946.

This report is the result of collaboration between the Geological Survey of Great Britain and the Road Research Laboratory. It was made in an attempt to bring together the geological and the engineering aspects of roadstones. It gives a description of the geology of roadstones and the characteristics of the constituent minerals and discusses the influence of both these factors on the physical properties of the rock. The sections prepared by the Road Research Laboratory describe the accepted mechanical tests for roadstones, summarize the results of a large number of such tests carried out on British stones over a period of 30 years, and discuss the significance of the results in relation to engineering practice.

Plummer, Norman, and Hladik, W. B. The manufacture of ceramic railroad ballast and constructional aggregates from Kansas clays and silts: Kansas Geol. Survey Bull. 76, pt. 4, 212 pp., 8 pls., 1 map, 6 tables, bibl., 1948.

The State of Kansas chiefly is dependent on crushed limestone for such uses as railroad ballast, concrete aggregate, and road metal. Relatively hard limestone is plentiful in the eastern half of the State, but only soft limestone occurs in abundance in the western half.

Under conditions of severe use limestone is regarded as inadequate for railroad ballast due to its softness, dustiness, and tendency to form a water-retaining mud. Concrete made with some limestone aggregates tends to disintegrate under conditions such as those to which concrete highway slabs and bridges are subjected. The needs of the railroads for a durable ballast are particularly acute in this vast central area of the United States where sources of naturally occuring hard rock are inadequate.

A series of tests conducted in the ceramics laboratory of the State Geological Survey has demonstrated that a durable material suitable for use as railroad ballast, concrete aggregate, and allied uses can be manufactured with standard industrial equipment from the cheap and abundant clay and silt resources of Kansas. The method of manufacture involves the vitrification or pyroplastic agglomeration of the raw materials in a rotary kiln, or possibly some other type of firing equipment. In this report the product is termed "ceramic slag" to avoid the use of more accurately descriptive but awkward terms such as "ceramic agglomerate," "ceramic aggregate," or "vitrified clay."

Laboratory production of ceramic slag chiefly was conducted in a high-temperature electric kiln. Check runs were made on a number of representative samples in a batch-type gas-fired rotary kiln. Pilot-plant tests on one type of material, a Pleistocene clay, have been made by the Mineral Products Co. in a 30-foot continuous rotary kiln.

Materials tested included silt, clay, and shale samples of Pleistocene, Cretaceous, Permian, and Pennsylvanian age collected over a wide geographical range. In general, Pleistocene silts and clays, particularly those from loess deposits, have proved to be the most satisfactory materials.

It is estimated that the cost of producing ceramic slag will range from $1.15 to $2.25 per ton if the processing is carried out on a large scale in a rotary kiln.--Authors' abstract.

Portevin, M., La pierre [Stone]: Construction moderne, no. 7, pp. 246-255. 15 figs., July 1949.

The topics discussed by the author include terminology referring to stone cutting; crushing strength, hardness, and resistance to wearing by friction; approximate relation between breaking stress and density; difficulty of cutting deduced from theoretical hardness; Brinnel hardness; "specific value of stone cutting" (Rondelet); classification and coefficients of stone cutting; standard scale of typical hardnesses; comparison of cutting difficulties (test principle, selection of workmen and tools, tests, applications of results); and determination of susceptability to frost action (standard method, Buisson's method, microscopic examination advocated by M. Bourcart).--Translated and adapted from abstract 46-29, Documentation technique des Annales de l'Institut Technique du Bâtiment et des Travaux Publics, Paris.

Smith, W. H. Sand and gravel resources in northern Ohio: Ohio Geol. Survey Inv. Rept. 6, 24 pp., 1 map, Columbus, 1939.

This is the report of a study made in an area of northern Ohio, which, owing to the increase in building activity during the past several years, experienced a serious shortage of sand and gravel for construction purposes. General information was collected regarding the geological structures in the critical regions that have not been prospected for sand and gravel largely because of lack of knowledge regarding their location and possibilities for commercial production. After data on production, transportation, processing of sand and gravel, and specifications and grading of aggregates, the geology and distribution of the deposits are given, followed by a discussion of deposits by counties. The text is accompanied by bibliographic references and a glacial map of Ohio showing the location of producers.

CONSTRUCTION WORKS

Andrae, Charles. Les grands souterrains transalpins [The large Transalpine tunnels], 200 pp., 69 figs., Zurich, S. A. Leeman Frères & Cie., 1948. Price, F. 22 (Swiss).

This is the second revised edition, in French, of a volume published in German in 1926 but now out of print. In it the author, who at that time was a professor at the Federal Polytechnic School of Zurich, included the subject matter of a course he gave in order to initiate the students in the practical experiences and scientific results obtained from the construction of the large Alpine tunnels (Mont Blanc, Grand St. Bernard, and others), to which he personally contributed.

The author deals successively with the main problems, technical and practical as well as scientific, that arose from the construction of long tunnels at great depths. The more deeply a tunnel is driven, the more important is the question of pressures due to the load of the roof, and the question of temperatures becomes the cardinal problem. The latter is treated with particular care, taking into account the observations made at the Simplon and the methods that were

suggested in order to avoid as far as possible any incident in the future. Although this book was originally intended for students, it will also be valuable to the practician. The following subjects are treated: mechanical drilling; removal of materials; geological problems (general observations, earth pressures, temperatures, and groundwater); ventilation and cooling; tunneling methods; lining; sanitary measures; work organization; costs; bibliography.

Bendel, Ludwig. Das Sprengen in Fels [Rock blasting], 60 pp., 17 figs., Lucerne, Eugen Haag, 1942.

This booklet deals with the main uses of explosives in quarries and in the construction of galleries and tunnels. The use of these materials for destructive purposes is not considered.

The main terms used in blasting technics are first explained, and some theories concerning the different kinds of explosives and blasting methods are mentioned. The composition and combination of the various explosives used in quarries and their methods of application are given in detail, as is information on drilling in rocks. The formulas for the determination of the probable explosive requirement constitute the essential part of the work; the Bendel formula takes into account the influences of geologic and petrographic factors on the quantity of explosives required. The discussion of the composition and combination of explosives contains information acquired through experience and, where it can be turned to account, information from other publications on the subject. A few computations regarding the construction of tunnels, quarrying, and ice blasting show practical application of the results of research on blasting. The last part of the book deals with possible effects of explosives (air displacement, vibrations, etc.) and indicates preventive measures.

....., Untersuchungen über die physikalischen und dynamischen Eigenschaften des Untergrundes von Strassen, Flugplätzen und Trambahnen [Investigations concerning the physical and dynamic properties of foundation ground for roads, airfields, and tramways]: Strasse und Verkehr, 28 pp., 36 figs., Jan. 19, Feb. 13, and Mar. 12, 1948.

On the basis of concrete cases, the author, an expert in geotechnical problems, studies the physical and dynamic properties of foundation grounds for roads, tramways, and airfields. He gives interesting and useful information on the most recent methods of soil investigation.--Translated and adapted from Bull. tech. de la Suisse Romande, Jan. 1, 1949.

British Intelligence Objectives Sub-Committee. German underground installations, Part 1, Unique design and construction methods: Final rept. 1, 63 pp., Sept. 1945.

In an effort to minimize the effectiveness of allied bombing the German military and civilian elements resorted to underground installations. There are three reports by the British Joint Intelligence Objectives Agency on the actual physical structures and their utilitarian and protective features. The first discusses the unique design and construction methods used by Germany in building large underground factories, only nine of which have been described at length.

The most unique construction was that of the four semi-underground Messerschmitt factories near Munich. These factories were unusual in construction because (1) the roof was a 10-foot-thick reinforced concrete arch with a span of 280 feet; (2) the roof arch was ppured on 163,000 cubic yards of gravel fill that had to be excavated after the arch concrete had set; (3) the 5- and 8-story buildings constructed underneath these roof arches were made entirely of precast columns, beams, and floor slabs; and (4) the heating and ventilating designs were larger and more elaborate than those for any other underground factory.

The oil-distillation factory and the tank-part factory at Ebensee were also outstanding because (1) they incorporated all the latest design features of German underground factories and (2) the tunnels were concrete-lined in a rapid, efficient manner by using precast concrete arch ribs to support the precast wall-liner plates. The salient features of many other underground factories are also described--Adapted from India Central Board of Irrigation abstract 52, Feb. 1949.

British Intelligence Objectives Sub-Committee. German underground installations, Part 2, Adaptations of existing facilities: Final rept. 2, 35 pp., Sept. 1945.

For the most part the Germans simply remodeled existing mines, caves, beer cellars, railroad tunnels, etc., for the purpose of accommodating factory installations previously housed above ground. This type of installation is here considered, and though nothing new from an engineering viewpoint is introduced, the report is important in portraying what may be accomplished through minor revisions to existing underground structures.--Adapted from India Central Board of Irrigation abstract 82, Feb. 1949.

..... German underground installations, Part 3, Various installations of general interest: Final rept. 3, Sept. 1945.

This report considers a miscellaneous group of installations of general interest, some of which are introduced principally because of their usage--for example, Hitler's retreat at Berchtesgaden and S. S. headquarters at Munich. There are eight sections: (1) headquarters and residences; (2) power plants; (3) shelters; (4) munition plants; (5) oil depots; (6) tunnels; (7) communication centers and (8) fortifications.--Adapted from India Central Board of Irrigation abstract 82, Feb. 1949.

Disney, C. P., and Legget, R. F. Modern railroad structures, 213 pp., 151 ills., London, McGraw-Hill Publishing Co., Ltd., 1949. Price, 30s.

This is a profusely illustrated record of advanced ideas used economically and successfully in the design and construction of railway structures in the United States, Canada, and Great Britain. A whole chapter of the book, with many references in other chapters, is devoted to the importance of site investigations before any form of design is undertaken for new or the replacement of old structures. The structures surveyed include earth structures, substructures and superstructures of bridges, turntables and turntable pits, and engine sheds.--Adapted from a review in Civ. Eng. and Pub. Works Rev., London, Jan. 1950.

Eckel, E. B. Engineering geology in Germany: Joint Intelligence Objectives Agency Rept. 18, 1949.

This is a report on the following: (1) underground factories in anhydrite and gypsum near Nordhausen; (2) a sulfur-cement plant at Niedersachswerfen; (3) interrogation of the geologic consultant on underground factories; (4) source data for investigations of German and French underground factories, including a descriptive list of underground factories and storage depots with locations, sizes, uses, etc.--Adapted from JIOA subject index of scientific and technical reports, vol. 1, Aug. 1949.

Feger, ... Les usines souterraines allemandes [German underground factories]: Rev. génie militaire, tome 82, pp. 165-199, fig., Mar. - Apr. 1949.

German attempts to place the country's war industry under shelter are described. Included in the report are a geologic and geographic study of the sites of underground factories and discussions of various types of underground factories (one or more stories), excavation methods, linings, inside equipment (heating, ventilation, electric supply, etc.), and organization of production.--Translated and adapted from abstract 485-28, Documentation technique des Annales de l'Institut Technique du Bâtiment et des Travaux Publics.

..... Les usines souterraines suédoises [Swedish underground factories]: Rev. génie militaire, tome 82, pp. 229-253, 8 figs., May - June 1949.

The installation of underground factories in Sweden is discussed with sections on excavation methods, underground constructions (lining, floors), inside equipment (ventilation, lighting, motive power, water supply, protection against fire, social equipment), and outside features.--Translated and adapted from abstract 265-29, Documentation technique des Annales de l'Institut Technique du Bâtiment et des Travaux Publics.

Kollbrunner, C. F. Fundation und Konsolidation [Foundation and consolidation], vol. 1, 476 pp., 216 figs., Zurich, Schweizer Kruckund-Verlagshaus, 1948.

This is a detailed review of the present state of knowledge concerning types of foundation ground and its application to foundation technics. Included are useful data on ground water (flowing, pumping, etc.), a critical analysis and synthesis of testing methods presently applied in the laboratory and in the field to determine the character of foundation ground, and a detailed study of the distribution of stresses beneath constructions and the computation of settlement. There are numerous charts.--Adapted from a review in Bull. tech. de la Suisse Romande, no. 15, July 17, 1948.

Maclean, D. J. The effect of the soil foundation on the road surface and outline of existing knowledge: Dept. Sci. Ind. Research [Great Britain] Road Research Tech. Paper 11, 29 pp., 1948.

In the last decade a great deal has been learned of the properties of soil as an engineering material and of the part played by the subsoil in the behavior

of road pavements. This paper is a progress report attempting in a brief compass to bring the various phases of knowledge together. It deals with the effect of the subgrade on the road surface; factors affecting soil strength; the measurement of soil strength; the regression of subgrades due to traffic, frost, or moisture, pavement design; and the effect of the road surface on soil layers below the subgrade.--Adapted from India Central Board of Irrigation abstract 139, Feb. 1949.

McCutchen, W. R. Similitude in the study of military geology: Military Engineer, vol. 41, no. 279, pp. 7-9, 1949.

The problem of creating dimensionally valid models to use in simulating large-scale explosion tests is explained. Using the fundamental ratios of length, mass, and time, the model ratios for values of density, velocity, acceleration, pressure, strain, and work are derived. The amount and kind of explosive to be used in a 1:200 model to simulate an atomic bomb is determined. A brief discussion by Col. S. B. Smith is included.--D.J.V.

Muller, W. Erdbau [Earthwork], 287 pp., 121 figs., Berlin, Wilhem Ernst & Sohn, 1948.

This is the study of the earthwork required for the construction of railroads and roads. The conditions to be fulfilled in order to provide economical construction and operation are stated, and the design of railroads and highways is discussed with particular reference to the crossing of other lines of communication (land or water ways). The last three chapters deal with the soil as foundation ground; earth movement; and material used for excavations and fills and the construction and protection of dams, fills, and cuttings.

Nipkow, ... Construction of an intake tunnel for Moerel power plant through a zone of high pressure: Schweizerische Bauzeitung, vol. 65, pp. 522-523, 12 figs., Sept. 20, 1947.

The irruption of water loaded with dolomitic muds and disintegrated phyllitic clay in a zone of contact between the Triassic and the Jurassic is described. Considerable pressure was noticed on the framework of the tunnel, which caused a partial crushing of the timbering. These followed the setting of a reinforced concrete sole, 0.6 meter thick, constituting a segment of the intended tunnel. The use of quick-setting alumina cement and the reinforcement of frames and timberings are discussed.--Adapted and translated from Documentation technique de l'Institut Technique du Bâtiment et des Travaux Publics, tome 4, Dec. 1947.

Ott, J. C. La construction du barrage de Bou-Hanifia, Algérie [Construction of the Bou-Hanifia dam, Algeria], 30 pp., 17 bibl. ref., special edition published by the Societe du Bulletin Technique de la Suisse Romande, 1946, taken from Bull. tech. de la Suisse Romande, Feb. 5, and 19, 1944.

This is a general description of the major structures at the Bou-Hanifia irrigation project. The river regimen and the geologic and topographic conditions inherent in the site presented an unusual number of difficult construction problems. This project is an outstanding example of the solution of these problems through the skillful use of modern engineering knowledge.--H. V. Complete translation prepared.

Roessinger, R. Irrigations et houille blanche en Algérie [Irrigation and water power in Algeria]: Bull. de la Société Neuchâteloise de Géographie, tome 52, fasc. 1, no. 4, pp. 1-7, Neuchâtel, Switzerland, 1946.

This paper deals with the construction of irrigation dams in Algeria, studying the regimen of Algerian streams, the subsurface material (as compared to dams in Switzerland), and one typical dam of each group built: the rock-fill dam of the Ghrib, multiple-arch dam of Beni-Bahdel, and gravity dam of Oued Fodda. Subsurface water stops and elaborate drainage systems that involve unusual elaborations in rock-fill practice are described. Photographs and drawings are attached.--Complete translation prepared.

Seaton, T. H. Coast erosion and sea defense, with special reference to problems on the east coast of England associated with the London and North Eastern Railway: Inst. Civ. Eng. [Great Britain] Railway Paper 29, pp. 3-20, May 1948.

In this paper the author treats the subject on broad lines, suggesting the direction in which investigation might be made. He analyzes the causes of coast erosion and describes the movement of beach material, the silting up of harbors and river mouths, erosion due to wave action, and such measures to counteract current and wave action as the setting up of groins and sea walls--Adapted from India Central Board of Irrigation abstract 152, Feb. 1949.

Stokstad, O. L. German airfields design and construction methods: Joint Intelligence Objectives Agency Rept. 48, 129 pp., 1949.

This report is a compilation of evaluation reports on the design and construction methods of German airfields. It does not represent a complete coverage of all enemy airfields, but is a representation of selected fields with regard to general geological and dominant soil areas into which Germany is divided. Map, plans, diagrams, and photographs are included.--From JIOA subject index of scientific and technical reports, vol. 1, Aug. 1949.

Tchekotillo, A. M. Underground caches in the layers of permafrost [in Russian]: Priroda [SSSR], no. 11, pp. 27-32, 5 figs., bibl., 1946.

The permafrost area in Siberia extends south to the Kiev parallel. Its depth ranges between 40 to 50 meters in the south and 600 meters at Iakoustsk. The natives have for a long time used this frozen ground for the construction of underground caches for the purpose of conserving their provisions. Lately the State has started making tests with a view to large-scale application of

such caches, the advantages of which can briefly be summarized as follows: very simple construction, constant temperature and humidity, possibility of maintaining the temperature up to 8 to 10° C. (by ventilation), very simple exploitation, use for scientific research, safety with regard to fire.--Translated and adapted from Bull. anal. du Centre National de la Recherche Scientifique, 1949 (10-16816).

Utûdjian, E. Urbanisme Souterrain (lère section). Rapport général [Underground town planning (1st section). General report]: Monde souterrain, no. 49, pp. 126-128, 5 figs., Oct. 1948.

This report was presented at the second world congress, at Rotterdam, on underground technics and town planning. It concerns methodical underground arrangement and embodies the program of the congress, divided into two parts, The first section deals with the general problems of town planning and doctrinary order. The second part discusses more particularly the problems of geology, soil mechanics, building methods, monographs of works, and underground equipment.--Translated and adapted from abstract 46-23, Documentation technique de l'Institut Technique du Bâtiment et des Travaux Publics, no. 23, Paris, Mar.-Apr. 1949.

Van Welter, L., and de Clerq, J., Le barrage-reservoir de la Vesdre, à Eupen (The Vesdre storage dam at Eupen): Annales des Travaux Publics de Belgique, tome 49, pp. 19-48, 21 figs., 4 pls., Feb. 1948.

This is a description of the main structures of a storage dam (capacity, 25,000,000 cubic meters) on the Vesdre River upstream from Eupen in Belgium. The regimen of the Vesdre and its tributaries, geologic and topographic conditions, the selection of a gravity dam, and projected power stations are among other topics discussed.--Translated and adapted from abstract 473-21, Documentation technique des Annales de l'Institut Technique du Bâtiment et des Travaux Publics, Paris, Jan. 1949.

Wiedgman, K. Guide for the construction of tunnels in unstable rock (German "Kunz method" for excavating tunnels): Joint Intelligence Objectives Agency Rept. 42, 47 pp., 1949.

The Kunz plan was to discard the old schemes of tunneling, which utilized large quantities of timbers for shoring purposes and required large crews of skilled carpenters for their installation, and to substitute a steel shell that would not only carry the rock load but also be available as form work for the concrete work.--Adapted from JIOA subject index of scientific and technical reports, vol. 1, Aug. 1949.

DRILLING AND EXPLORATION METHODS

Anonymous. Le fonçage d'un puits en sables boulants par le procédé Honigmann [Shaft sinking in quicksand by means of the Honigmann process]: Génie civil, tome 124, no. 18, p. 363, Paris, Sept. 15, 1947.

The lignite basin of Cologne, one end of which is actually being operated by the open-cut method, subsided in its central section, where there is a lignite layer 40 meters thick; its roof and wall, of clay, are good. Intentions are to mine this underground layer by slices, because it contains a reserve of 30 billion tons, but in order to reach it, 300 meters of quicksand must be penetrated. In such circumstances the shaft is usually sunk by the artificial-freezing process; here, however, two shafts were sunk, 300 meters apart, one by artificial freezing and the other by Honigmann's process, which proved satisfactory.

By the Honigmann process, described in detail by Pinsard in the Revue de l'industrie minerale of April 1947, the bore hole is first filled with a dense suspension of clay in water, the level of which is maintained higher than the water-bearing stratum; under high pressure, the suspension penetrates the level of saturation and yields its clay to form an impervious wall. A succession of drillings of increasing diameter is made until the final diameter is reached, and the metallic tubing for the bottom of the shaft is put down, after being hermetically closed at the bottom by a cement plug; the tubing floats in the suspension; it is lowered by filling it with water. When the upper ring is flush with the surface, the following ring is jointed, and so on. After the casing is completed, the annular space between the tubing and the ground is filled with cement.

It is estimated that, up to a diameter of 4.50 meters, the Honigmann process is more advantageous than artificial freezing; beyond 5 meters, artificial freezing would be preferable.--Complete translation prepared.

Lemaire, E. Use of sulphitic liquor to reduce the resistance of quartzose rocks in drilling: Génie civil, tome 121, pp. 33-34, 1 fig., Feb. 15, 1944.

Identification of a large number of materials can be made by measuring their hardness. However, hardness is not a constant characteristic of materials and varies according to the medium in which the test is carried on. This variation, although generally slight, is large enough to justify the adoption of new methods of drilling. Tests were carried out on quartz by using different solutions that showed the variation in hardness. The practical conditions for using the aqueous solutions of lignin-solphonic acid and its salts, which were found to reduce the hardness of quartzose rocks, were determined by means of an apparatus similar in operation to the crown of a rotary drilling machine. A description of the apparatus and test is given.--Complete translation prepared.

Poldini, E. La prospection électrique du sous-sol [Electrical prospecting of the subsoil], 1 vol., 114 pp., 22 figs., Lausanne, Switzerland, F. Rouge & Cie., 1947.

The new edition of this work includes new developments in geophysics and improvements in its methods. Only a few pages deal with theory; the author, professor at the University of Geneva, pays particular attention to the services that may be rendered by geophysics, showing the results, good and

bad, obtained in the field during many years of experience. The main chapter headings follow: Heterogeneity of soils in relation to electricity and technics used in electrical prospecting; Measurement of apparent resistivity (boring, electric boring, map of resistivities, telluric currents); Tracing of equipotential curves. Earthing; Anisotrophy of soils. Natural electric currents; Electrical exploration of boreholes; Possibilities of electrical prospecting: tectonic studies, ores, petroleum, water, civil engineering.

The publication of numerous practical results attained by different geophysical missions was authorized by the Société de Prospection Electrique and the Compagnie Générale de Géophysique.

GENERAL ENGINEERING GEOLOGY

Bendel, Ludwig. Ingenieur-Geologie, vol. 2, 832, 20 pp., 620 ills., 252 tables, Vienna, Springer Verlag, 1948. Price, L7 17s.

Besides a considerable amount of personal research and theoretical work by the author, this book contains a compilation of more than 6,000 observational results, collected from books, magazines, papers and lectures all over the world. More than 1,000 specialized theories are explained.

The first volume, which is out of print at present, contains as main chapters: Geology and petrography for the civil engineer; Properties of the soil (physics, chemistry, and biology); Statics and dynamics of the soil (including earth pressure, settlement, bearing capacity, permissible loads, pore-water movement, and ground-water movement), and an extraordinarily valuable chapter on mathematical statistics for engineering geologists.

The second volume deals in detail with site investigations, including borings, soundings, geophysical surveys, hydrological investigations, local bearing tests, chemical investigations of water and soil, meteorological investigations in the field and recording of settlements; soil tests in the laboratory (for dams, piles, tunnels, etc.); model tests, including similarity laws; and dynamics (vibration and earthquakes). A chapter on snow, avalanches, and glaciers by the Zurich expert, Dr. Haefeli, is of particular interest because of the close association of snow and soil. Also included is a chapter on soil surveys in connection with town and country planning.

The main value of this work lies in its accurate description of methods and of field and laboratory apparatus and other equipment used in the more important countries all over the world, as well as references to the original publications where more detailed information can be gained.

A third volume containing the newest developments in engineering geology is to be published in 1949.--Adapted from a review in Civ. Eng. and Pub. Works Rev., vol. 44, no. 515, London, May 1949.

Bray, Arthur. Geology applied to building and engineering, 196 pp., 53 figs., London, Sir Isaac Pitman & Sons, Ltd., 1948.

This book deals with certain raw materials that are extensively used in the building industry and in civil engineering. A short introductory chapter on the general principles of geology is given, which makes the rest of the work readily understood. Other chapters deal with quarrying and mining methods, surface deposits and sites, sands and gravels, sandstone for masonry and other purposes, limestone for building stone, brick clays and fire clays, slates and other roofing materials, igneous rocks, water supply, materials used in paints and pigments, etc. This book should be of great help to students, as well as to practicing builders, architects, and civil engineers.--Adapted from the book's announcement.

Desio, Ardito. Geologia applicata all'ingegneria. L'esplorazione dell'sottosuolo. Idrogeologia applicata. Geomorfologia applicata. Geologia delle construzzioni. Geologia mineraria [Engineering geology. Ground investigation. Applied hydrology. Applied geomorphology. Geology of building materials. Mining geology], 850 pp., 305 figs., Milan, Ulrico Hoepli, 1949.

This volume treats of geologic investigation of the ground, rocks, minerals, their mode of occurrence, dislocations of the earth crust, geologic mapping, geophysics, methods of deep exploratory drilling, and applied geomorphology. The chapters on applied hydrology include studies of surface water and of ground water; the second part, which is treated at great length, analyzes methodically the problems of finding water. The chapters on the geology of building materials will be useful to engineers and architects seeking the geologist's viewpoint regarding the carrying out of large construction works, foundations, dikes, airports, etc. In connection with mining geology, the metalliferous deposits and the methods of prospecting for liquid and solid fuels are thoroughly studied.

Fox, C. S. The geology of water supply, 220 pp., 49 figs., Kingston Hill, Surrey, England, the Technical Press, Ltd., 1949, Price, 25s.

The author discusses the circulation of water in nature; rain (formation, distribution, influence of soil, temperature, etc.); geologic and geographic considerations (influence of soil relief, hills of volcanic origin, moist winds, glaciers, torrents, etc.; regimen of streams; stability of slopes; distribution of surface water); circulation of ground water (influence on flow of streams; artesian wells); dams, aqueducts, and other structures; and quality of water.

Froment, G. Procédés généraux de construction [General construction methods], 2 vols., 490 and 314 pp., 285 and 277 figs., Paris, Eyrolles, 1949. Price, F. 2300 (vol. 1) and F. 1600 (vol. 2).

Included here is the subject matter of a course given by the author to students of public-works engineering. The first volume deals with soil investigation, drilling, earthworks, drainage, underground works, blasting methods, transport of excavated material, etc. The second volume mainly treats of soil mechanics and foundations: determination of the foundation layer, preparatory work for the foundations, use of piles and sheeting piles, pile driving, and various types of foundations and their protection.

Kaisin, Felix, Jr. Géologie du génie civil [Engineering geology], Louvain, Belgium, Dewallens, 1947 (?).

This volume deals with the contribution of geology to engineering work, in conjunction with the knowledge recently acquired on soil mechanics, and discusses geologic formations and rock characteristics, stratigraphy, age of formations, tectonics, landslides, erosion and recent sedimentation, glaciers, seashore erosion, wind action, hydrography, and surface and ground water. Examples of the application of geology to engineering work are given, as are examples of failures in construction that were due to lack of geological information. Numerous pictures and drawings show the application of geology in specific instances.--From a reference in Génie civil, no. 1, 1947. Date of publication and number of pages not given.

Trefethen, J. M. Geology for civil engineers: Maine Univ., Maine Technology Exper. Sta., Paper 56, 3 pp., June 1949.

The use of geology as a tool of engineering has become an integral part of modern engineering practice. The civil engineer meets a variety of problems in which geological training is of service. Therefore his engineering course should include the basic principles of geology. The author gives several specific aims of a properly organized course in geology for engineers, which course of study should enable the engineer himself to make use of geology as a tool and also to use the geological investigations of others in the course of his professional practice.

LANDSLIDES AND SUBSIDENCES

Agard, M. Les glissements, et éboulements des quartiers Saint-Raphael et Télemly à Alger et les travaux envisagés en vue de la stabilisation des terrains [The landslides and rock falls of the Saint-Raphael and Telemly districts in Algiers and stabilization methods contemplated]: Annales des ponts et chaussées, no. 4, pp. 465-480, 10 figs., July-Aug. 1948.

The causes of the landslides and rock falls are here studied, including the breaking away of large blocks of molasse through disintegration and the perforation of the underlying marl layer, which expands under the effect of infiltration accelerated by the glauconite present in the upper layers. The stabilization measures consist of drainage, construction of a dam for controlling the slide, and support of a cliff by means of underpinning.--Translated and adapted from abstract 41-23, Documentation technique de l'Institut Technique du Bâtiment et des Travaux Publics, no. 23, Paris, Mar. 1949.

Cailleux, A.,, and Tricart, J. Un type de solifluction, les coulées boueuses [A type of solifluction, mud slides]: Rev. géomorphologie dynamique, vol. 1, no. 1, pp. 4-46, 15 figs., 2 tables, bibl., 1950.

Topics discussed are characteristic external forms of mud slides, including various types in valleys and on steep smooth slopes; mechanism of sliding; original causes of mud slides as determined by the factors of lithology, permeability, fracturing, water content, slope, and several types of climate; and preventive and curative measures. A condensation in English is provided.--D. J. V.

Denissov, N. J. On the theory of the processes of landslides: Akad. Nauk SSSR, Doklady, vol. 54, no. 8, pp. 717-719, 1946.

The sliding property of clay soils in the fluviatile valleys and along sea coasts depends upon the type of clay. This is a study of various factors that have to do with the sliding process: pressure, cohesion, friction, etc.--Translated and adapted from Bull. anal. du Centre National de la Recherche Scientifique (10-16316), 1949.

Dervieux, F. Etude géotechnique des glissements de terrains des coteaux d'El-Biar, Alger [Geotechnical study of the landslides on the hillsides of El Biar, Algiers]: Terres, eaux, no. 1, pp. 48-57, 1 fig., Jan.-Feb. 1948.

This is a geotechnical study of the ground upstream and downstream from the cliffs of El Biar for the purpose of finding out the causes of the disturbances that have occurred for many years in this region.--Translated and adapted from abstract 45-23, Documentation technique de l'Institut Technique du Bâtiment et des Travaux Publics, no. 23, Paris, Mar.-Apr. 1949.

Kittl, Erwin. Derrumbamientos, deslizamientos y torrentes en caminos de montaña de la Republica Argentina [Rock falls, landslides and torrents along mountain roads in the Argentine Republic]: Universidad de Buenos Aires, Publicaciones de la Faculdad de ciencias exactas, fisicas y naturales, ser. B., no. 16, 91 pp., 41 figs. and photographs, 1939.

This volume deals with certain superficial movements of the earth crust and in particular with those soil movements that affect roads and railroads. A study of these phenomena may help in avoiding or repairing the damages they cause. Before discussing and describing specific phenomena that have occurred along mountain roads in Argentina, the author first gives general data on (1) classification of mass movements; (2) causes of movements; (3) slides of loose masses; (4) slips of rock over inclined surfaces; (5) falls of rock of different types (granitic, volcanic, gneiss, mica-schist, slate, quartzite, etc.); (6) erosion and deposition of alluvium by torrents. This is followed by a description and a special study of seven instances of landslides of various types in Argentina.

Mackin, J. H. Engineering geology in West Seattle: Trend in Engineering, vol. 1, no. 3, pp. 24-26, Seattle, University of Washington, July 1949.

Following a conference of representatives of the City Engineer's office, a committee of West Seattle residents concerned with the Alki Avenue slide problem, and members of the University of Washington faculty, the work of mapping foundation materials in the Seattle area was started in West Seattle. A diagrammatic cross section of the West Seattle hill illustrates the general geologic relations of the larger sedimentary units that make up the hill.--Adapted from PRA's abstract.

Messines, J. Les éboulements dans les gypses. Inefficacité des travaux de reboisement [Landslides in gypsum. Ineffectiveness of reforestation]: Paris Acad. Sci., Comptes rendus, tome 226, no. 16, pp. 295-296, Apr. 1948.

On January 30, 1948, a landslide occurred at Breuil, commune of Puget-Theniers, in the Maritime Alps, France, on a steep slope consisting of gypsum and clayey marl and crowned by a terrace of old alluvium. A lake of about 10 hectares was formed behind a dam due to the accumulation of fallen materials, and communications were interrupted for several weeks. The author studied the causes of the slide. They are multiple and result from morphologic, geologic, and exceptional meteorologic conditions. Owing to heavy rain that fell for 8 days before the catastrophe, a sudden flood of the Var and the afflux of seepage water from Gourdan Mountain filled the system of caves and underground galleries of the Breuil terrace. Under the pressure of water, a collapse was produced by the rupture of one or several underground cavities. The pressure of captive water, with a strong horizontal component, combined with gravity, projected materials horizontally and completely dammed the valley across a width of more than 80 meters. This slide is similar to that of Roquebilliere in 1926. No direct intervention seems possible to avoid the reoccurrence of such a phenomenon in formations where the presence of extravasated gypsum is found, and reforestation, in particular, would be without effect.--Complete translation prepared.

Wedler, D. B., and Leutkens, Vd. Bauten im Bergsenkungsgebiet [Constructions in mining districts subject to subsidences], 1 vol., 100 pp., numerous figs., Berlin, Max Lipfert, 1948.

The author deals with the effects, on surface structures, of settlements and subsidences resulting from mining. Theoretical and practical study of some practical solutions, with diagrams and plans, is included.--Translated and adapted from abstract 68-29, Documentation technique des Annales de'l Institut Technique du Bâtiment et des Travaux Publics, Paris, 1949.

MAPPING TECHNIQUES

Hagen, Toni. The use of ground photogrammetry for large-scale geological mapping: Eidgenossische Tech. Hochschule, Geod. Inst., Mitt., no. 2, 23 pp., 11 figs., Zurich, 1948.

This communication is addressed to geologists, mining engineers, surveyors, and civil engineers. It describes the making of a photo-geological map from start to finish. The main chapters are: (1) The process of photo-geological mapping (principle of ground photogrammetry, selection of map scales, instruments employed, station position, geodetic field work, plotting of the map, expenses of photo-geological method); (2) The plotted survey photographs; (3) Plotting of front elevation in the Wild stereo-mapping machine A6. The text is supplemented by 3 plates: geological map of Mont Dolin, Valais, Switzerland; 5 geological front elevations of Mont Dolin; and 12 geological sections of Mont Dolin.

Linton, D. T. The ideal geological map: Advance Sci. [Great Britain], no. 5, pp. 141-149, July 1948.

This is a review of the geological maps existing in the various countries with an appreciation of the methods followed in each one to solve the problems involved: indications that must be given, colors used, characteristics of the topographic background, etc. Deduction is made therefrom as to what should be the ideal geological map.--Translated from Bull. anal. du Centre National de la Recherche Scientifique, 1949 (10-16897).

PERMAFROST

Berezantsev, V. G. On the strength of permanently frozen soil under the footings of structures: Myorzlotovedenie, vol. 2, no. 1, pp. 48-54, 1947.

The first question of importance is to which class the soil belongs; that is, whether its load-bearing capacity depends on internal friction, on shear strength, or on both. A compression diagram for clay at a temperature of -10.4° C. and for sandy soil at -3.1° C. shows a fundamental distinction in the behavior of these soils after the proportionality limit is reached. Slightly frozen soil behaves like a hard, plastic body, but soil at lower temperatures acts like a hard, brittle body. It appears that the load-bearing capacity of frozen soils, with the exception of dry sandy soil, depends essentially on the shear strength. This conclusion is confirmed by a theoretical deduction based on Prandtl's theory and his formula for the ultimate bearing capacity. In that formula the internal friction is relatively unimportant and may be neglected, especially, in the present case, with a shear strength of 2 kilograms per square centimeter or more and an angle of internal friction 20° or less. Values are given for the compressive strength of various soils at temperatures from 0.5° C. to -2.0° C. A discussion of the phenomena in soil under strip footings follows. A formula is obtained for the initial plastic deformation at a given point. Experiments showed that with an increase in the extent of deformation in frozen ground a consolidated elastic body is formed, as in the case of rammed unfrozen soil. For frozen soil the shape of the consolidated body can likewise be assumed to be a prism of triangular cross section. The application of Prandtl's differential

equation to frozen soil is considered. It is found that the load at which failure occurs can be calculated for soil at not very low, though freezing, temperatures and that the results are sufficiently in agreement with the experimental values. The formulas for initial plastic deformation and that for the load causing failure may be used even for soil at rather low temperatures. The extremely high pressures that would be required in such cases make tests difficult.--Adapted from Building Science Abstracts, no. 502, Apr. 1948.

Dementyev, A. I. On the classification of permanently frozen soil from the engineering point of view: Myorzlotovedenie, vol. 2, no. 1, pp. 55-57, 1947.

In the classification of permanently frozen soils that is in common use in the U. S. S. R. the following are distinguished: horizontal extension (three soil types); vertical extension (two soil types); dependence on seasonal changes (two cases); physical condition of the soil, whether it is frozen soil in the normal state (that is, cemented by ice to a solid monolithic body), dry ground, or plastic, permanently frozen ground. Russian Standard Specifications OST 90032-39 state two principles for the design of buildings on permanently frozen ground, one to be applied when the soil condition is to be regarded as constant, the other when changes in the condition of the soil are to be expected. This connection between the condition of the soil and the principle of the structural design is of paramount importance. Suggestions have been made by experts for the classification of permanently frozen soil, some of which are quoted, including the regulations for the design and construction of railways on frozen soil. A precise definition of what is meant by a constant and a variable condition in frozen soil is needed, and also a numerical scale of conditions. It has been suggested that the temperature gradient--not only the temperatures themselves, but also their vertical distribution--could be used. The development of such a numerical scale is of urgent importance for the design of structures in permanently frozen soil.--Adapted from Building Science Abstracts, no. 501, Apr. 1948.

Kudryavtsev, V. A. On the determination of the lower limit of permanent freezing: Myorzlotovedenie, vol. 2, no. 1, pp. 44-47, 1947.

The lower limit of a frozen soil stratum is determined by test borings in the soil, which has been thawed with a warm salt solution. A diagram is given of the temperature gradient in a 500-meter deep test pit during the gradual restoration of normal soil temperatures. These curves have a sharp break, in this particular case at a depth of 200 meters; the conclusion reached, which was confirmed by theory, is that the break marks the lower limit of the zone of permanent frost. The same conclusion applies to dry soil, but the break in the curve is less abrupt. Results can thus be obtained within a few hours which otherwise would necessitate waiting for months until the soil had frozen again. --Adapted from Building Science Abstracts, no. 500, Apr. 1948.

PHYSICAL PROPERTIES OF ROCKS

Denissov, N. J. On the relation of the properties of clayey rocks to climatic conditions [in Russian]: Akad. Nauk SSSR, Izv., Ser. Geog. i Geofiz., vol. 12, no. 3, pp. 283-288, bibl., 1948.

Climatic conditions influence the various stages in the formation of clayey rocks. The author describes particularly the relation between these conditions and the density of clay of subaerial origin and assumes that the increase of moisture in clay formations with loess structure observed in southern Russia would be connected with the process of condensation of aqueous vapor.--Translated from Bull. anal. du Centre National de la Recherche Scientifique, 1949 (10-66077).

McCutchen, W. R. The behavior of rocks and rock masses in relation to military geology: Colorado School of Mines Quart., vol. 44, no. 1, 74 pp., Golden, Colo., Jan. 1949.

After a brief introduction giving a general classification of rocks in the earth's crust that are of interest to the military geologist, the effect of various factors on the physical properties of rocks is summarized.

The properties of elasticity and plasticity in rocks are then treated. Some other characteristic phenomena of importance in the study of rock strengths, such as creep, fatigue, and endurance, are also mentioned.

Failure of rock specimens under stress is given a detailed study. First, the accepted classical theories of failure are stated briefly; then the Mohr stress diagram is developed for a number of types of loadings, ending with a general state of stress. Using the Mohr stress diagram, a carefully controlled laboratory experiment on rock specimens is analyzed to deduce the manner of failure of rocks and the form of the envelope of rupture.

Finally, several examples of static and dynamic loadings on rock masses, including stress distribution around a tunnel opening, propagation of elastic strain, and crater blasting, and the principles of similitude as they may be used in the study of military geology are discussed. A specific example involving the detonation of an atomic bomb above an underground tunnel is presented as an illustration of the application of these similarity principles.--Author's abstract.

SOILS AND SOIL MECHANICS

Ariano, R. Sulla coesione e sull'attrito interno delle terre [Cohesion and internal friction of soils]: Strade, no. 6, pp. 135-146, 9 figs., June 1948.

The knowledge of the coefficients of internal friction and cohesion of soils is of great importance in road construction. Generally one refers for these questions to Coulomb formulas, but experience shows that owing to the complexity of the method, they are not adequate. There is not always complete agreement on the definition of the parameters of these formulas. The author gives the reason for these divergences and stresses the influence of the moisture content on these parameters. Several apparatus for the determination of soil strength are described, and diagrams and numerical tables show the results that

have been attained.--Translated and adapted from abstract 58-21, Documentation technique des Annales de l'Institut Technique du Bâtiment et des Travaux Publics, Paris, Jan. 1949.

Baudart, ... Reflexions sur les pressions de terrains [Earth pressures]: Rev. univ. mines, vol. 60, no. 7, pp. 268-273, 3 figs., Liege, 1947.

Topics discussed are the validity of the hypothesis concerning the plasticity of rocks; advantages derived from it in the representation or concept of the pressure phenomena that occur at great depth; danger of applying to earth pressures the conclusions drawn from the mathematical study of stresses in pulverulent media (coherent or elastic), as it is presently established; advisability of first determining by experiment the laws that govern earth pressures at diverse depths, laws that are still unknown; to attain this goal, the necessity of measuring stresses and earth movements; difficulty and actual importance of the scientific measurement of stresses.--Translated and adapted from Documentation technique des Annales de l'Institut Technique du Bâtiment et des Travaux Publics, Paris, tome 5, Oct. 1947.

Bautechnik-Archiv [Archives of public-works technics], Bd. 3, 74, pp., numerous figs., Berlin, Wilhelm Ernst & Sohn, 1949. Price, RM 7.20.

This volume deals with the technics of foundations and contains interesting theoretical and practical contributions by several German specialists in this field: MUHS, Foreword; History of the Degebo (German society for the study of soil mechanics); VOLK, Twentieth anniversary of the founding of the Degebo: AGATZ and LACKNER, Unsolved problems in foundation technics (earth pressure, underpressure, sheet piling, pile piers, massive foundations); MUHS, Activity of the Degebo from 1938 to 1948, exploratory drilling for the determination of the bearing capacity of foundation ground, loading tests, settlements of large structures, geotechnical map of Berlin, compaction of soils, pile driving, determination of earth pressures, vibration, and other studies; LORENZ, Application of the seismic method of soil investigation to the construction of a dam; BRENNECKE and ANSORGE, Metrology principles applicable to the determination of settlements of large structures; FORTSCH and MUHS, research on an inadequate foundation of compressors; RAMSPECK and SCHULZE, effect of vibration on walls and simple structures; and HERTWIG, Technical experimentation in geomechanics.--Translated and adapted from Travaux, p. 352, Aug. 1949.

Bonnenfant, ..., Les sols stabilisés au béton d'argile (Clay-soil stabilization): Rev. gén. des routes, no. 197, pp. 36-47, 5 figs., June 1948.

This is a review of four general problems of soil mechanics: variation of the physical properties of soil as a function of the moisture content; variation of the strength of water; variation of the physical and chemical properties as a function of its previous state and of the treatments to which it may previously have been subject. Also included are research on the best "clay concretes" and a study of typical diagrams of the binder; incorporation of gravel; granulometric formulas and California test.--Translated and adapted from abstract 146-21, Documentation technique de l'Institut Technique du Bâtiment et des Travaux Publics, Paris, Jan. 1949.

Capper, P. L., and Cassie, W. F. The mechanics of engineering soils, 270 pp., 122 ills., 25 tables, London, E. & F. N. Spon, Ltd., 1949. Price, 21s.

All the usual topics on soil mechanics are included, and a bibliography of 50 references to important papers is appended. The chapter on the classification of soils includes three classification systems; those of the Building Research Station, A. Casagrande, and the U. S. Public Roads Administration, as well as several particle-size classification systems, are illustrated. Apart from references to other works, very little descriptive matter is added to these tables of systems. Also treated are the methods of constructing flow nets and practical problems concerned with the settlement of foundations, piling, roads, and runways. The final chapter covers site exploration in a fashion similar to that of the draft British standard code of practice for site investigations.--Adapted from a review in Civ. Eng. and Pub. Works Rev., London, Jan. 1950.

Casagrande, L. Structures produced in clays by electric potentials and their relation to natural structures: Nature, no. 160 (4066), pp. 470-471, 1947.

Experiments carried out on London clay and Wyoming bentonite revealed that the prolonged electro-osmotic transport of pore water towards the cathode results in the formation of cracks in the soil around and between the electrodes, the pattern of the cracks following the equipotential lines. The structure persists even when the clay or bentonite is completely dry; when the sample is broken up, laminations following equipotential surfaces are seen. These laminations and a random-fissured structure exhibited by the sample are very similar in appearance to the observed natural structure of the older sedimentary clays, for example, Oxford clay, Weald clay, and London clay.--Adapted from Building Science Abstracts, no. 495, Apr. 1948.

Chisholm, Alan. Settlement of structures on clay foundations: Engineering [Great Britain], vol. 168, no. 4367, pp. 375-378, 20 figs., bibl., Oct. 7, 1949.

The properties of clay are first described. The author then states that the settlement of structures on clay foundations depends largely on the process of consolidation and partly on elastic changes. The theory of consolidation assumes that voids of clay are completely filled with water; water and solids are completely incompressible; the coefficient of permeability is constant; and the time lag of consolidation is due entirely to low permeability of clay. The process can be demonstrated by means of a mechanical device, which consists of a cylindrical vessel that contains a series of pistons separated by springs. The mathematical representation of the process of consolidation, causes of settlement of structures, methods and instrument used to measure the settlement, and information to be supplied by a soil survey in connection with settlement observations also are given.

Caquot, A., and Kerisel, J. L. Traité de mécanique des sols [Treatise on soil mechanics], 1 vol., 385 pp., Paris, Librairie Gauthier-Villars, 1949. Price, F. 1800.

This book treats of the equilibrium of masses with internal friction, stability of pulverulent or cohesive soils, determination of pressures exerted by or against earth masses, and estimation of strains to be expected in rocky grounds or sedimentary materials resulting from the disintegration of rocks with or without organic matter. Reviewing the original works of Boussinesq, the authors give a direct and rapid method of computation for the forecast of settlements. They also propose an explanation of the laws of variation of internal friction, a theory of silo foundations, and various other syntheses of experimental results presented at the second international conference on soil mechanics.

Debecq, A. La consolidation des terrains par la silicatisation [Soil consolidation through silicification]: Chimie et industrie, vol. 61, no. 2, pp. 144-145, Paris, Feb. 1949.

This process of consolidation consists of introducing into the soil a water-glass solution, which is stable only in the presence of an excess of soda and which solidifies through the precipitation of silica or an insoluble silicate. The author gives the principle underlying three European methods that have been used (Joosten, Gayard, and Francois). They differ only in the nature of the liquid introduced in the second place and in the way of proceeding to the two injections. After consolidation the compression strength of the soil depends upon the nature of the soil and upon the process applied: for fine sand it varies from 10 kilograms per square centimeter to 40; for gravel, from 40 to 100 kilograms, and for quicksand, from 100 to 190 kilograms. The process may be applied to foundations, to the underpinning of foundation grounds, and to cofferdams, dams, anchorages, and tunneling through soft ground.--Complete translation prepared.

Forschungsgesellschaft für das Strassenwesen. Abhandlungen über Bodenmechanik und Grundbau 1939-1948 [Transactions concerning soil mechanics and foundations 1939-1948], 215 pp., Berlin, Bielefeld, Detmold, Erich Schmidt Verlag, 1948.

Introduction.--Edgar SCHULTZE discusses the development of soil mechanics in Germany since the end of 1939. Topics discussed in subsequent sections, with their authors, are:

Section 1 (theoretical investigations).--SCHIEL, Friedrich, Theoretical approach to settlements; JELINEK, Richard, The soil as a transverse isotropic medium, stress distribution in a generalized state of uniform tension for transverse isotropic masses, stress distribution in semi-infinite space for transverse isotropic masses; SCHULTZE, Edgar, Construction and analysis of failure lines; SCHIEL, Friedrich, Earth pressure on retaining walls, bearing capacity of foundations of any soil profile; SCHULTZE, Edgar, Earth pressures and soil failure.

Section 2 (laboratory investigations).--DUCKER, Alfred, Suggestion for the denomination of grain sizes; SCHIEL, Friedrich, Determination of grain sizes.

Section 3 (building-site investigations).--SIEDEK, Peter, Apparatus for the recovery of undisturbed sand samples; MUHS, Heinz, A new sampler for the recovery of undisturbed soil samples; LEUSSINK, Hans, Research on shear strain of large undisturbed bodies of soil; LORENZ, Hans, Present state of the dynamic method of soil investigation and its future outlook; SIEDEK, Peter, Loading test by means of a caisson; MUHS, Heinz, Performance and results of a large load test; EBERT, Philipp, Measuring the pressure distribution in foundation ground by means of pressure cushions; SIEMONSEN, Friedrich, Bearing capacity of foundation ground and its effect on the tensile stresses of a foundation.

Section 4 (not given).

Section 5 (earth and water pressures on constructions).--SCHULTZE, Edgar, Water pressures on levees, cofferdams, and dams.

Section 6 (pressure and settlement determination for constructions).--AGATZ, Arnold, and LACKNER, Erich, Foundation design and settlement study for a large construction in the region of the lower Weser.

Section 7 (pile foundations).--HOFFMANN, Rudolf, Contribution to the question of the static and dynamic bearing capacity of piles; AHRENS, report on a 500-ton loading test of a Franki pile.

Section 8 (application of soil mechanics to road construction). LEUSSINK, Hans, Brief summary of the present state of soil stabilization and dirt-road construction in Germany; REINHOLD, Friedrich, Some important properties of "soil concrete"; DUCKER, Alfred, State of experimental frost research in relation to road construction; ERLENBACH, Lutz, Observations on frost damage in buildings and roads; LEUSSINK, Hans, New research on the vibration method; LOOS, Wilhelm, and AHRENS, ..., Soil compaction by the Franki-pile process for the foundation of a monumental structure; ERLENBACH, Lutz, Present status of the German methods of blasting in peat.

Appendix.--GOENER, ..., Instructions and standards in the sphere of soil mechanics and foundations; existing German laboratories working in the sphere of soil mechanics, bibliography of soil mechanics in Germany for the years 1939-47 (compiled by Edgar SCHULTZE and Peter SIEDEK).

India Central Board of Irrigation. Standards for testing soils: Central Board of Irrigation Pub. 42, iii, 195 pp., 79 figs., Aug. 1948.

Methods are given for testing soils as required for different engineering works to be carried out in India: (1) roads and airfield subgrades; (2) low-cost roads; (3) earth dams; (4) embankments; and (5) foundations for bridges, buildings and dams. The tests recommended under these various headings, both for routine construction purposes and for research work, have been outlined separately. Some of the methods are based on American practice; some were evolved in India.

Jennings, J. E. Foundation bearing tests and their interpretation: Nat. Building Research Inst. (South African Council Sci. Ind. Research), pub. 1, pp. 23-25, 1 pl., 7 figs., Pretoria, 1948.

This is a theoretical and experimental report on the bearing capacity of soils. Topics discussed are general considerations on the settlement of structures; the relation between shear tests and bearing tests; slight settlements; and rules governing the performance of the tests, which must be carried out with great care.--Translated and adapted from abstract 59-28, Documentation technique des Annales de l'Institut Technique du Bâtiment et des Travaux Publics, 1949.

Kersten, J. S. Thermal properties of soils: Minnesota Univ. Inst. Technology, Eng. Exper. Sta., Bull. 28,225 pp., 142 figs., June 1, 1949.

Thermal conductivity tests have been conducted on 19 soils at a number of different density and moisture-content conditions. The tests have shown that the coefficient of thermal conductivity varies in the following ways:

1. Above freezing it increases with an increase in mean temperature.

2. Below freezing, for soils at low moisture contents, it shows very little change; for greater moisture contents, it shows an increase for a decrease in temperature.

3. For a change from unfrozen to frozen soil, it changes variably according to the moisture content. For dry soils it does not change; for soils of low moisture content, it decreases; and for soils of high moisture content, it increases.

4. At a constant moisture content, it increases with an increase in dry density. The rate of increase is fairly constant and is independent of the moisture content.

5. At a constant dry density, it increases with an increase in moisture content.

6. At a given density and moisture content, it varies in general with the texture of the soil, being high for gravels and sands, lower for the sandy loams, and lowest for the silt and clay soils.

7. It differs appreciably for different soil minerals.

The specific heats of a variety of soils are all approximately the same. The values decrease with a decrease in temperature. The specific heat of soil-water mixtures may be calculated by proportion according to the percentage of weight of soil and water and the respective specific heats. The thermal conductivity of light-weight concrete slabs varies with the density.

Prediction of thermal properties.--On the basis of the thermal conductivity tests, four charts are presented to aid in the prediction of conductivity values for any other soil. Separate charts are given for sands or sandy soils and for silt or clay soils; two of the charts are for frozen material and two for unfrozen. Since the specific heat values were found to be quite similar for all soils tested, it appears to be reasonable to assume the same value for other soils. The diffusivity of a soil may be computed if its coefficient of thermal conductivity, specific heat, and density are known. Thus, the determinations of this research also serve as a basis for estimating diffusivity.--Author's summary.

Knight, B. H. Soil mechanics for civil engineers, 264 pp., 114 ills., 34 tables, London, Edward Arnold & Co., 1949. Price, 21s.

This is a basic and concise book of reference on the theories of soil mechanics. The most complicated mathematical proofs have been omitted, but sufficient mathematics is included to explain the theories involved. For those specialists who wish to investigate more thoroughly certain parts of the text a full set of references is provided that will enable them to pursue their studies. A particularly interesting chapter deals with the mineralogical and other properties of clay minerals, classifying them according to their structure and indicating the direction in which future research is desirable. The author has stressed the application of soil mechanics to road engineering problems. The stabilization of soils is treated with particular reference to road surfacings. A chapter on cuts, fills, retaining walls, and trenches will be found most useful to civil engineers. A most concise precis of the application of soil mechanics principles is surveyed in the last chapter. This volume, which is well illustrated and indexed, forms a notable addition to soil mechanics literature.--Adapted from a review in Civ. Eng. and Pub. Works Rev., vol. 44, no. 515, London, May 1949.

Kovda, V. A., and Lobanova, T. A. Soil stabilization by calcination and heating [in Russian]: Pedology [USSR], no. 5, pp. 293-303, 2 figs., 6 tables, bibl., English summary. Date not known.

Alkaline and clay soils become more stable and mechanically more resistant after calcination at 250° to 300°; acid clays require 300° to 400°; the light, dustlike, and acid clays and the neutral soils with high moisture content, 400° to 500°; loess, sandy clay, and "solonchaks" (saline, white alkali soils, according to G. W. Robinson) remain unchanged after calcination at 150° to 500°. Calcination produces a stable crust 2 to 3 centimeters thick. A high moisture content (15 to 20 percent) reduces the effect of calcination.--Translated and adapted from Bull. anal. du Centre National de la Recherche Scientifique (10-66152), 1949.

Piaskovsky, B. V. Loess stabilization by a solution of silicate and salt [in Russian]: Pedology [USSR], no. 11, pp. 675-685, 5 figs., 5 tables, bibl., English summary, 1946.

This paper is an elaboration of a method for stabilizing loess by means of $\overline{Na_2O.\ SiO_2}+\overline{NaCl}$ in solution. The improvement of some properties is obtained:

stability in regard to water, increase of solidity, reduction of permeability, change in filtering properties. The method used is a physico-chemical process producing a pellicle of gel of silicic acid at the contact of the solution with the soil rich in salts.--Translated and adapted from Bull. anal. du Centre National de la Recherche Scientifique, 1949 (10-16814).

Remenieras, G. Application de l'electroosmose à l'exécution de certains travaux en terrains aquifères [The application of electro-osmosis to certain types of construction on water-bearing soils]: La Houille blanche, special no. A/1949, pp. 393-404, 12 figs., bibl., 1949.

The author provides a general view of some recent applications of electro-osmosis to the acceleration of the drainage of very fine grained soils (particles under 1/50 millimeter) such as silt, loess, etc. The essential aspects of electro-osmosis and of two closely connected phenomena, electro-phoresis and the electromotive force of filtration, are briefly recalled. This is followed by an analysis of the remarkable work done by M. M. Schaad and Haefeli, of the Ecole Polytechnique, Zurich, who made experimental studies on the electro-osmotic actions produced by passing a direct current through fine-grained soils situated below the water table. The great values of the "electro-osmotic charge," which were measured in certain soils by the Zurich research workers, would come as a surprise to many engineers; they show that the action of a relatively low-power electric current can cause the natural filtration speed in very fine grained soils to increase 10 or even 100 times. Electro-osmotic drainage, the success of which is thus accounted for, is used to "lower the water table" with a view to the construction of railway cuttings, foundations for large permanent structures, etc., on such fine-grained soils that classical drainage wells are useless. The examples of large-scale application given by the author after a note by M. Casagrande, the originator of this method, are particularly striking. Finally, the author indicates the tests he is carrying out with a view to the application of electrophoresis to the desilting of water containing particles that are too fine to allow the rapid clarification of the water by means of the conventional gravity-type desilting device or decanter.--Translated from La Houille blanche.

Reynolds, H. R., and Protopapadakis, P. Site exploration, laboratory procedure and the preparation of a soil mechanics investigation report: Civ. Eng. and Pub. Works Rev. [Great Britain], vol. 44, nos. 513 and 514, pp. 140-144 and 198-201, 8 figs., Mar. and Apr. 1949.

The work involved in a comprehensive soil mechanics investigation may be divided as follows: (1) site exploration and soil sampling, (2) soil testing, (3) analysis of results obtained, (4) preparation of report. Information relevant to the first, second, and fourth stages is given in this paper: objects of the site investigation; features to which consideration should be given; methods of investigation; penetration test with boring rods; text pits; post-hole auger borings; boring tackles with winch borings; soil sampling; type of equipment and apparatus needed for a soil mechanics laboratory to perform classification and consolidation tests and to determine the structural characteristics of soils; basic requirement and details for a soil mechanics report of information obtained both on the site and in the laboratory.

Statens Geotekniska Institut. Kortfattat Kompendium i Geoteknik [Précis of geotechnics], no. 1, 58 pp., bibl., Stockholm, 1946.

The following chapters are included: (1) Soil properties; (2) Soil investigations; (3) Earth pressure; (4) Problems of stability and settlement; (5) Erosion; (6) Consolidation; (7) Admissible foundation loads on the different types of soils.--Translated and adapted from abstract 49-21, Documentation technique des Annales de l'Institut Technique du Bâtiment et des Travaux Publics, Paris, 1949.

Tiedemann, B. Über Bodenuntersuchungen bei Entwurf und Ausführung von Ingenieurbauten [Soil investigation in planning and building engineering structures], 2d ed., 40 pp., 29 figs., Berlin, W. Ernst & Sohn, 1942.

The author deals with the following subjects; shaft and investigation borings; recovery of undisturbed samples; sample analysis; field investigations; necessary equipment; pumping and sinking.--Translated and adapted from abstract 52-21, Documentation technique des Annales de l'Institut Technique du Bâtiment et des Travaux Publics, Paris, Jan. 1949.

Tsytovich, N. A. Soil mechanics [in Russian], 2d ed., 388 pp., Moscow, Gosizdat, 1940.

This treatise is written primarily for civil engineers, but certain sections of the book are also of interest to geophysicists--for example, the chapter on kinds of soil and their physical characteristics, granular composition, porosity, permeability, density, and fluidity. A separate chapter deals with permanently frozen ground and observable phenomena in connection with its thawing and freezing. The last chapter deals with different methods of soil investigation for engineering purposes, procedure of sampling, laboratory testing, interpretation of the results obtained, and application of data obtained to field work.--S.T.V. (abstract 11152 of U. S. Geol. Survey Geophysical abstracts 137).

Van Der Burot, J H., and Van Bendegom, ... The use of vegetation to stabilize sand dunes, London, Inst. Civ. Eng., adv. copy, Sept. 21, 22, and 23, 1948.

The origin of Dutch sand dunes is given, together with the influences that govern their formation and transformation. There is usually some kind of vegetation in these dunes; this article describes the ways in which the people in Holland interfere with Nature in furthering the stabilization of these dunes. The main purposes of the stabilization are: (1) to check the burying of cultivated land and (2) the maintenance of the retaining walls. The artificial formation of new dunes has also been considered.--Adapted from India Central Board of Irrigation abstract 209, Feb. 1949.

Verdeyen, Jacques. Mécanique du sol et fondations [Soil mechanics and foundations], 1 vol., 568 pp., 321 figs., Desoer, Liege, and Eyrolles, Paris, 1947. Price, F. 1,200.

Soil mechanics, a science relatively young and in full evolution, let to a complete revision of all concepts, often empiric, that were at the basis of the study of foundations and of ground equilibrium. Currently, it enables one to explain and to avoid the numerous accidents that were due to errors of concept and interpretation.

The present book is a synthesis of knowledge acquired during the last few years, taking into consideration results of recent research hitherto unpublished.

In the first part of the book, the author explains the main theories and experimental methods actually used in soil mechanics. The second part deals with the main principles to be applied to the rational execution of the different types of foundations and gives numerous applications and examples of structures realized, which may assist the technician in the study of new problems that he has to solve.—Translated from Génie civil, tome 124, no. 12, p. 244, 1947.

Von Moos, Armin, and De Quervain, Francis. Technische Gesteinkunde [Technical mineralogy], 220 pp., Basel, Birkhäuser, 1948. Price, F. 33 (Swiss).

This book gives valuable information on both Lockergesteine (Swiss term for unconsolidated sedimentary deposits) and Festgesteine (rocks), the first author dealing with the former and the second dealing with the latter. It fills a useful place between the textbooks on geology and those on soil mechanics. It is a valuable reference book, covering a wide and unusual field.

The following chapter headings give an idea of the scope of the book: (1) Review of the most important rock minerals; (2) Important technical properties of rocks and their determination; (3) The major rocks and their behavior (Lockergesteine and Festgesteine); (4) The behavior of rocks and soils in foundation, etc. (foundations on rocks and soils, roads and runways, compaction, dams, slips, adits, tunnels and shafts); (5) Special requirements of rocks according to use; (6) Quarrying stone; (7) Working stone; (8) Weathering of building stone.

Some of the sections are quite short and only outline the subject. The book is well illustrated by photographs and diagrams. There is an adequate index and bibliography, which, although it contains some foreign works, consist mostly of Swiss references (in German).

Interior—Duplicating Section, Washington, D. C. 90511