

1.5 cusecs. The same holds good for the tubewell water. We should preferably not go in for big tubewells, the utilization of the discharges of which would require division of water into two or more branches and running the water-courses long distances involving heavy seepage losses. This suggests the construction of medium capacity tubewells of 1.2 to 1.5 cusecs discharge.

Tubewell with indigenous materials

Hundreds of thousand's of tubewells have to be installed in West Pakistan to solve the drainage and salinity problems. This calls for intensive research and investigation to find out the most economical design for a tubewell suited to our needs and resources. By organising intensive researchs, designs of tubewells made from indigenous materials should be evolved. As the irrigator has to pay for the tubewell water, he is vitally concerned with the initial cost of the tubewell, its replacement cost and the cost of maintenance and operation. Care will have to be taken not to over-capitalize projects by depending too much on imported materials and foreign loans. Abraham Lincoln once stated:

“An individual who undertakes to live by borrowing soon finds his original means devoured by interests and next, no one left to borrow from.....so must it be with a Government.”

Category (IV) areas

Areas provided with perennial irrigation and having brackish ground water present the most difficult problems both technical and economical. The drainage schemes for these areas may consist of open drains or tubewells, pumping into a network of disposal drains. The less costly of the two depending upon the drainage characteristics of the soil

profile will have to be adopted.

The perennial Sutlej Valley areas on the left bank of the river which were a part of Cholistan have all brackish ground water which was 70 to 90' below ground level when the canals were dug but has been rising ever since. Though in parts of these areas, the ground water is still below 15' and the salinity which always follows the rise of the ground water to within a few feet of the surface has not yet started but there are quite large areas where the ground water is already within 10' and the salinity hazard is spreading rapidly. Any delay in providing drainage in these areas would be fatal because once these areas are salinized their reclamation will be out of question on account of non-availability of both the river and ground waters. Due to the construction of link canals with capacities limited only to replace historic withdrawals, there will be no possibility of carrying the additional discharges required for reclamation. These areas should, therefore, come under a very high priority for the provision of drainage otherwise the BUS will be missed for good.

Initially Saline Areas now fertile

It may be mentioned that most of these areas were declared saline after carrying out scientific investigations at the time of colonization. Some experts were of the opinion that the lands will not develop and should not be colonized. (Similar recommendations are being received from WAPDA's Consultants for large areas in G. M. Barrage). But with very hard work and great patience, the farmers of the Sutlej Valley Canals, mostly self-cultivators of good agriculturist classes, undaunted by crop failures, have reclaimed these lands by sustained irrigation and cultivation. Slowly and steadily the salts in the root zone have been depressed

and the top soil is now fit to produce very good crops. The areas once considered useless are now fertile and very prosperous.

Saline ground water areas urgently need

Drainage

Though the Irrigation water had helped to depress the salts in the soil but with the rising ground water, not only the soil salts which had been depressed are moving back to the surface but very much larger quantities of salts in the extremely brackish ground water are moving upwards with it. The ignorant farmer is not at all aware of the dangerous happenings below the surface of his land and the fate which awaits him. He has only the satisfaction that with his persistent hard work, he has succeeded in meeting the challenge of nature and has turned the sands into gold. Delay in tackling the drainage problem in this area will kill the goose which lays the golden egg.

In case of Chaj, Rechna and Bari Doab, where the ground water in the centre of the doab is brackish such as near Sargodha, Lyallpur and Montgomery, it is generally still below 10' but is continuously rising. Drainage should be provided for these areas well in time. The water drained out will not be fit for irrigation and will have to be disposed of into the rivers.

Safe Ground water Depth

In Zones of brackish water the aim should always be to drain out only as much of it as would keep the ground water deep enough to check the rise of salts by capillary action and at safe depth from the plant roots. In case of perennial Gaja area of Ghulam Muhammad Barrage having brackish ground water, WAPDA's consultants have proposed tubewell drainage to stabilize it at 7.5' below the ground level. Mining of brackish water

below this depth will be useless and wasteful. Similarly in the brackish zones of the upper Doabs the provision of drainage should take care of only stabilizing the ground water at depths of about 10'. As the pumped water cannot be made use of, there will be no advantage in overpumping.

Shallow Tubewells more effective

It may be stated that the discharge which can be handled conveniently by a farmer will not have any bearing on determining the size of tubewells in brackish zones but it may be borne in mind that greater the yield of a tubewell the greater the draw-down or the cone of depression, needing thereby a greater height for the pump to lift and greater consumption of power. In a bigger tubewell, the draw-down exceeds the pumping head up to which a centrifugal pump can operate and, therefore, the use of the much more expensive vertical spindle turbine pump costing 20 to 30 times more becomes obligatory. Moreover shallow tubewells are more effective for lowering of the ground water-table than the deep ones. The latter may even be drawing water from sources far away from the wells.

Shallow Pumping improves water quality

For the sake of water quality also a tubewell pumping out brackish water should not be a deep one. Getting mixed with seepage from canals, the ground water in the upper strata improves in quality. By pumping from the shallow depths only, the tubewell water will become fit for irrigation in due course. Water pumped out from deep depths will, on the other hand, remain perpetually brackish and useless.

PRIORITIES

From the foregoing discussion it is clear that the order of priorities for the Drainage

and Reclamation Projects must be based on the urgency of problems of areas in different categories. If the order of priorities is fixed without consideration of the comparative urgencies, some areas are likely to be lost beyond recovery. The following is the order of priorities which the foregoing discussions suggest :—

1. Perennial areas with brackish ground water within 10 feet.
2. Non-perennial non-rice areas with

brackish ground water within 10 feet.

3. Perennial and Non-perennial areas with usable ground water within 10 feet.
- 4 Non-perennial rice areas with brackish ground water within 10 feet.

These priorities are from the point of view of drainage alone. The areas which will be lost permanently if not tackled in time deserve higher priorities.

(Continued from page 37)

confidence and pride and by a pat on the back, I am sure, the engineer will rise to the occasion and play a major role in building the economy of the Province with efficiency and speed.

While we are in the midst of Centennial celebrations of the Public Works Department, our thoughts go back to the worthy engineer sons of the land who gave their lives to the service of the nation with their boots on. M/s Faqir Mohammad Khan, Superintending Engineer and Majid Ullah Khan died when a roof of Shahi Mehmankhana, Peshawar

collapsed in 1937, Mr. F. H. Khan, Executive Engineer, was killed by a hostile bullet in D. I. Khan District in 1938. Mr. Abdul Ahad Khan, Executive Engineer was buried under the debris of a falling roof at Lahore in 1930. Ch. Mohammad Hussain, Executive Engineer, was killed in a jeep accident in Sukkur in 1945-46. Abdul Latif, Sub-Divisional Officer, died due to an accidental fall from a roof in Rahimyar Khan in 1952. These are not the only martyrs, there are many more high and low, who sacrificed their lives in the service of the nation and the Public Works Department is proud of them.

News and Notes

SIXTH INTERNATIONAL CONFERENCE ON SOIL MECHANICS

The Sixth International Conference on Soil Mechanics and Foundation Engineering will be held in Montreal in Sept., 1965. Place of the meetings will be the Place des Arts beginning Sept. 8, and concluding Sept. 15. Object of the conference is to provide an opportunity for the presentation and comparison of new ideas in soil mechanics, foundation engineering and allied fields. For further information regarding the submission of papers, contact Mr. Richard Woodward, Jr., Woodward-Clyde-Sherard & Associates, 1150, 28th St., Oakland 8, Calif.

INTERNATIONAL MATERIALS CONFERENCE

The International Conference on Materials, sponsored by the American Society for Testing and Materials, will be held in Philadelphia, Feb. 3-6, 1964. The program of the conference is concerned with the application of physics in the measurement and testing of materials and the use of physics instrumentation. Further information regarding the program is available from ASTM Headquarters, 1916 Race St., Philadelphia, Pa., 19103.

INTERNATIONAL COMMISSION ON LARGE DAMS OF THE WORLD POWER CONFERENCE

Eighth International Congress Meeting on Large Dams will be held from Monday 4th May to Friday 8th May, 1964 at Edinburgh.

This Commission was established in 1928 with a view to encouraging improvements in research, design, construction, maintenance and operation of Large Dams. So far in the last seven meetings, 27 different questions have been discussed.

The four questions on which contributions are invited include the following:

Question No. 28

Physical and mechanical properties of rock *in situ*, means of determining these properties and improving them, with special reference to the design and construction of large dams.

Comments on this question will include :

- (a) general properties of rock, their physical, chemical and mechanical behaviour *in situ*, the influence of load, time and water on overall performance.

- (b) the measurements on rock in situ under loading conditions similar to those under a large dam.
- (c) improvement of rock foundations for large dams in strength and watertightness by grouting and draining systems.

Pressure tunnels and high pressure shafts will not be discussed.

Question No. 29

Results and interpretation of measurements made on large dams of all types, including earthquake observations.

Authors will concentrate on giving up to date field observations made on or in the immediate vicinity of large dams.

Adequate field data on earthquakes are of considerable importance. The apparatus, design calculations and the dams themselves should be described only to the extent necessary for a proper understanding of the circumstances. The interpretation of the observations should aim at the establishment of reliable design criteria for future use.

Question No. 30

Design of Concrete for large dams of all types and influence of age on concrete properties.

The papers should deal with :

- (a) the selection of concrete for all types of large dams needed to meet diverse sites and climatic conditions.
- (b) the specification in detail of concrete and the variations with age of the main properties of concrete such as strength, elasticity, watertightness, frost resistance and thermal properties.

- (c) the consideration of factors which give rise to cracking and the behaviour in general of concrete under combined loading (combined compressive and tensile strength etc.)

Question No. 31

Design, methods of construction and performance of high rockfill dams (above or about 80 metres).

Papers in the question are to either of completed dams of above or about 80 metres in height, or of high dams under construction.

Emphasis is to be placed on performance data, on the type of rock, and on the grading, placing and compaction of rockfill.

Geology, design and other features are to be included as features of the rockfill.

The object of the papers is to document experience and economical engineering practice. The discussion at the Congress will be directed to individual papers to discuss specific features and to advance the technology of high rockfill dams.

All correspondence relating to Reports and Technical Papers for the Eighth Congress should be submitted through the various National Committees to :

The Secretary-General.
International Commission on Large Dams.
Central Office.
51, rue Saint Georges.
Paris IXe, FRANCE.

Five different study tours of 6 to 7 days each are planned. All study tours will start on 10 or 11 May and will end on 16 or 17 May.

In Vol. 6 No. 3 of the *Engineering News* information about the earlier questions and their discussion is given.

SCIENTIFIC HYDROLOGY

Unesco, Arid Zone Centre Paris, Proposes long term Programme of Research in Scientific Hydrology.

Unesco Headquarters, Paris, held a preparatory meeting from 20 to 29 May, 1963 to prepare grounds for research in Scientific Hydrology. Representations of forty-eight Members States and 13 International Conferences attended. This conference recommended 53 studies in the field of water balance, five in Geochemistry and six in Geomorphology of streams and erosion and four on the influence of man on hydrological phenomena. Briefly the recommendations on Water Balance Studies were as under :—

Precipitation

The conference recommended :

- (a) Installation of Hydrological Decade Stations with a network of rain-gauging stations. The standard and the accuracy of observation to be controlled preferably by adopting Interim Reference Precipitation Gauge (IRPG). Special efforts to be made to instal snow gauging to measure snowfall, its water equivalent etc.
- (b) Maps and charts to be prepared showing rainfall, intensity, duration, area frequency data of all states on which will be based the distribution, fluctuation and chemical composition of precipitation,

Evaporation and Evapotranspiration

- (a) Development of standard instrumentation for different categories of stations, from the simplest to the most complex, for measuring evaporation from open water surfaces, evapotranspiration and, if possible, evaporation from the soil.
- (b) Promotion of the formation of networks for observation on open water surfaces, in liaison with the meteorological and benchmark stations, and the experimental basins, to enable the influence of the different natural environments to be studied.
- (c) Promotion of the installation of weight lysimeters and other types of lysimeter making it possible to calculate the different elements in water balance or the overall balances.
- (d) Wide dissemination of data on evaporation and particularly evapotranspiration obtained from the station networks and from lysimeters.

Surface Water

Each state to select a certain number of Hydrological Decade stations having standard and quality measurement for a ten years' period and this data may be published regularly.

As far as possible, mechanical processing to be encouraged and systematic study of drainage basin and climate changes to be recorded.

Soil Moisture

- (a) Promotion of studies on measuring instruments and measurement

methods for the different types of research, coupled with an endeavour to standardize, as far as possible, those methods and instruments and the presentation of the results obtained.

- (b) Encouragement of laboratory research into the phenomena of water migration at the soil-air interface, particularly in arid and semi-arid zones, with wide dissemination of the results.

Ground Water

To promote studies of deep lying aquifers, collection of hydrogeological information of research into changes in the salinity of natural water due to irrigation, drainage, evaporation and over development of water reserves.

Encouragement of studies of levels, magnetic origin of water, age of water, under-flow studies and the methods of recharge etc.

Snow and Ice

Snow gauging, glaciers and special study of floods and run-off forecasting.

Suggestions were also put forth to collect information on specific aspects of water balance Hydrological forecasting.

Geochemistry of Natural Waters

The suggestion for studies included :

- (a) Development of the study of the physical and chemical properties of ground water in conjunction with the study of water circulation and of the special hydrological problems connected with infiltration. Encouragement of the use of radio-

active tracers as a possible means of yielding precise information on ground water circulation.

- (b) Study of the geochemical cycle in representative basins, for which it will be necessary to establish geological and soil maps in advance.
- (c) Promotion of joint studies by specialists in public health, quality of water, and hydrology, with a view to ensuring public water supplies of satisfactory standard.

Erosion, Stream Bed Evolution, Transport and Deposition of Sediments

- (a) Promotion of research on bed load measurement especially by estimating the amount deposited in existing reservoirs and storage ponds.
- (b) Laboratory and scale-model studies of the interrelations of grain-size distribution and the hydraulic conditions of stream-flow end of the evolution of sand-banks.
- (c) Dissemination of all the knowledge obtained on suspended load transport sediment traps, silting of reservoirs or canals, alluvial river and scale-model studies.

LATIN AMERICA

Scientific Conference on its Arid Regions

Six hundred scientists coming from thirty-one countries gathered in the Salo Dorado of the Town Hall of the City of Buenos Aires on the morning of 16 September 1963, to attend the inaugural session of the Scientific Conference on the Arid Regions of Latin America, which was organized jointly

by Unesco and the Argentine authorities.

During the six days working session, sixteen study and four lectures were arranged.

Lectures were delivered on—

1. Potentialities for saline water conversion and the provision for power in arid area.
2. Water resources management in arid zones Meteorological problems.
3. Hydroponics and Geoponics.

The study sessions for arid regions discussed :—

Agronomic Problems.

Water economy in relation to the vegetation.

Study and utilization of plant communities.

Water-shed management.

Human problems.

Possibilities methodology and co-ordination of inter-disciplinary studies in arid zones.

Criteria for defining aridity.

Grazing problems and range managements.

Pests as aggravating factors of denudation.

Erosion.

Land use.

Problems of utilization of ground water in deserts.

Soil and water conservations.

Reclamation and improvement of saline and alkaline soils.

Transpiration.

Industrial uses of desert plants.

There were also two Plenary Sessions devoted to economic development problem and method of implementing research programmes.

NINETEENTH SESSION OF THE ADVISORY COMMITTEE ON ARID ZONE RESEARCH

The nineteenth Session of the Advisory Committee was held in Santiago de Chile from 23 to 25 September, 1963. Dr. A. G. Asghar, Vice-Chancellor attended as a Pakistan representative.

The next Session is to be held at the Central Arid Zone Research Institute, Jodhpur in November, 1964, on the occasion of the formal opening of the institute and in conjunction with a symposium on arid zone ecology to be organized by the Ministry of Scientific Research and Cultural Affairs, India and Unesco.

Scheme and Industry

Pakistan Council of Scientific and Industrial Research by starting this Journal has added one more quarterly periodical to the several other being produced in this country. There was a great need for a scientific journal for disseminating of information needed by industrialist.

The journal has four sections devoted to review articles, applied research, articles and non-technical notes and other news. *Engineering News* wishes all success to the journal.

N. N. TEST AND RESEARCH LABO- RATORY FOR WAPDA POWER WING

The power wing of Wapda has decided to set up a central testing and research laboratory. This will help to lay appropriate standards for equipments and materials. It is expected that large amount of capital would be saved as a result of this testing which may help in adopting standards for electrical equipments, suitable for the conditions prevailing in this country. This laboratory was

long overdue. The electricity branch of Engineering has undertaken a very wise step. No branch of Engineering can successfully function without research in this age of scientific and technological development.

SEATO GRADUATE SCHOOL OF ENGINEERING, BANGKOK

Obtains an IBM 1620 Electronic Computer

It is installed at the Statistical Computing Centre of Chulalongkorn University. A Pakistani, Mr. Iqtidar Chaudhry is presently using this powerful tool.

Dr. A. R. Cusens, Director of Research has issued a short Summary to Research Work completed and which is currently in progress at the school of Engineering. Brief description and abstracts of results are put forth. This bulletin is No. 3 of October 1, 1963 issued by the School.

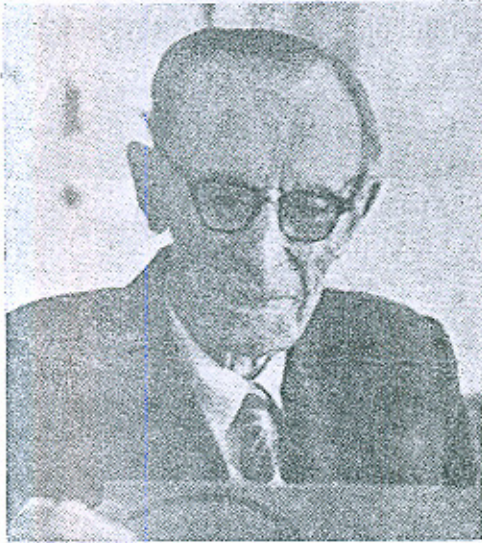
Visiting Professors and Scientists

Mr. P. L. Capper, Senior Lecturer in Civil Engineering at University College,

London delivered two Lectures in Lahore at the Buildings and Roads Research Laboratory from 23 October, 1963.

The subject of Lectures were (i) Pore Water Pressure and Effective Stress and (ii) Soil Mechanics in Highway Engineering. Previous to this the Professor had lectured in Karachi and Peshawar and later on went over to Bangkok.

Mr. Wayne D. Criddle of the famous Blaney Criddle formulae for estimating Evapotranspiration and water requirements of crops conducted a three-week course on his subject of investigation at Lahore. He taught to a big class of Engineers, Agriculturists and Forest Officers. On the 22nd of July, he delivered a Lecture under the auspices of Institute of Engineers Pakistan when members of other engineering organizations, like West Pakistan Engineering Congress, Members of American Society of Civil Engineers and Members of Indus Basin Society were also present.



Soils Expert Karl Terzaghi Dead

Karl Terzaghi, regarded by many as the father of soil mechanics and an internationally renowned foundation expert, died. He passed his 80th birthday early in October, still serving as a consultant and lecturer at Harvard University.

From his native city of Prague, then in Bohemia, Mr. Terzaghi's expertise carried him around the globe and brought the highest honours the industry can bestow. He was educated in Austria and supervised projects in Russia and Eastern Europe before coming to this country in 1912.

While working on reinforced concrete structures, he was struck by lack of information on earthwork and foundation engineering. So he spent two years studying soil data accumulated by the U.S. Reclamation Service.

Abroad again, during 10 years at the Institute of Technology and Robert College in Turkey, his research inaugurated a new engineering science.

By the time Mr. Terzaghi returned to the U.S. in 1925, he had developed his fundamental principles of soil mechanics. Frederick E. Schmitt, then ENR's editor, encouraged him to introduce these theories, through the pages of *Engineering News Record*. The six articles that resulted that year were only a fraction of his voluminous publishing efforts many of which subsequently appeared in ENR as recently as last year with his Does Foundation Technology Really Lag? (ENR Feb. 15, 1962, p. 58).

In 1925, he also became a lecturer at Massachusetts Institute of Technology with a consulting practice in the U.S. and Central America. In the following years he taught in Vienna and at the University of Illinois while pursuing foundation problems on every major continent. He tackled the Chicago subway system, Mexico City's subsidence, Kenney Dam in Canada and France's Serre Poncon Dam, plus river control projects in India and Russia and, most recently, Egypt's Aswan Dam.

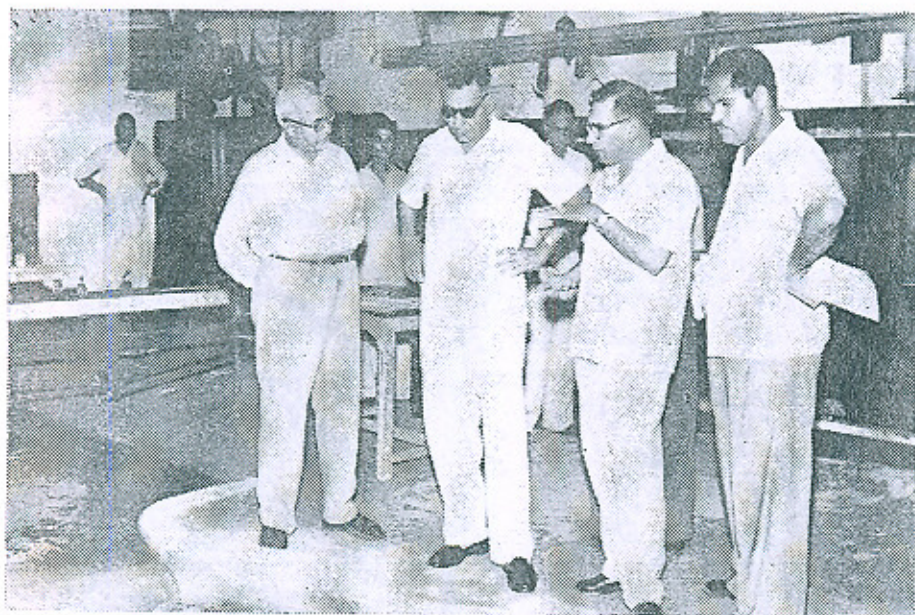
MOHAMMAD AKRAM SHEIKH DEAD

The Engineers of Pakistan will be grieved to learn of the untimely death of one of their eminent members.

For more than 25 years he served the Public Works Department of Sind. Till lately as Additional Chief Engineer, Ghulam Mohammad Barrage, he actively planned its drainage. The alignments proposed by him are still being followed. As Chief Engineer, Irrigation, he took keen interest in the well being and prosperity of the Department.

Before his death he was serving as a member of the Federal Public Service Commission, Karachi.

All engineers of the Profession are shocked to learn of his untimely death and sympathise with the bereaved family.



Late Sh. Mohammad Akram (2nd from left), Chief Engineer
West Pakistan in the Research Institute, Lahore

RECENT BOOKS

Modern Trends in the Design and Construction of Dams and Power Houses.

Kanwar Sain.

Atma Ram & Sons, Booksellers & Publishers
Kashmere Gate, Delhi—6.

Theory of Ground Water Movement.

J. M. Roger.

Princeton University Press Princeton U.S.A.
613 Pages Price 10.00 \$, Edition 1962.

Design of Water Resource Systems.

Mass Arthur, Hufschmidt Maynard M.
Dorfman Robert.

Thomas Barold, Marglin Stephen A.
Macmillan & Co. London W.C.2.
620 Pages, Price 90 \$, Edition 1962.

Hydraulics.

N. S. Govinda Rao.

Asia Publishing House, London W.C.2.
(England).
412 Pages, Edition 1963.

The Theory of Electromagnetic Flow Measurement!

J. A. Shercliff.

Cambridge University Press London.
146 Pages, Price 27s. 6d, Edition 1962.

Dam Geology.

Walters R.C.S.

Published by Butterworths London 1962.

Many Civil Engineers and Geologists are keenly interested in the relationship between geology and the stability and permeability of dam foundations. A book in which Mr. Walters has recorded his experiences of dam construction over many years is therefore very welcome.

In his introductory chapters the Author discusses the problems of site investigation, the suitability of various types of dam for particular combinations of topography and geology, grouting, and the causes of some of the major dam failures. The

main part of the book is, however, concerned with the particulars of a large number of dams in Europe, Algeria, and North America, although a few sites in other parts of the world are mentioned. The details of the dams and the geology at the various sites are illustrated by photographs and line drawings.

Soil Mechanics.

A. R. Jumikis.

Published by D. Van Nostrand Co. Ltd.
London & U.S.A. Price £ 5.

This book deals with the historical development of the subject, then with physical properties of soils, suction and freezing, seepage and drainage, consolidation and settlement, shear strength, elastic stress distribution, earth pressure theory, bearing capacity, piles and dynamics formulae, slope stability and soil exploration.

Earth and Rockfill Dam Engineering.

George F. Sowers.

Published by the Asia Publishing House
London.

A series of lectures given to the Water Resources Development Training Centre at Resources Development Training Centre the University of Roorkee, India, formed the basis of the book which Professor Sowers has written "to provide" as he states in his Preface "an introduction to earth and rockfill dam engineering for the engineer who is not familiar with the modern developments in the field".

The book is divided into twelve chapters dealing with soil formation, engineering properties of soils and rocks, seepage analysis, earth pressure and stability analysis, settlement, soil and rock investigations, earth dam design, hydraulic fill dams, rockfill dams and finally control testing.

From Theory to Practice in Soil Mechanics.

Karl Terzaghi.

Published by John Wiley London and New York.

This important book which was planned to celebrate the 75th birthday of Professor Terzaghi, should be read by every engineer interested in foundation problems and every engineering geologist. It is divided into four parts. Part I, "Life and achievements," contains two biographical chapters on the life and work of Professor Terzaghi by A. Casagrande and L. Bjerrum. This first part concludes with a chapter by A. W. Skempton, "Significance of Terzaghi's concept of effective stress," an historical study which is itself a valuable contribution to the literature of soil mechanics, and in which it is established that by 1923 Terzaghi had grasped the significance of effective stress in soils problems, and had published the equation $a' = a - u$; a deceptively simple statement which is the foundation of modern soil mechanics and which had revolutionized thought in an important branch of civil engineering.

It is indeed the concept of effective stress which distinguishes the work of Terzaghi from that of his predecessors and led to the establishment of a new science. "Preceding work, even by such great engineers as Coulomb, Collin, Rankine, Resal, and Forchheimer was of limited validity owing to the absence of this fundamental unifying principle."

Part II opens with a translation of the introduction to "Erdhaumechanik," first published in 1925, the book which gives the first systematic treatment of soil mechanics. This is followed by the Presidential Address given at the First International Conference at Harvard in 1936; "The influence of modern soil tests on the design and construction of foundation," published in 1951; and finally by Professor Terzaghi's Presidential

Address to the Fourth International Conference in London in 1957.

All these writings are of a general nature and record the development of the Author's ideas between 1925 and 1957; years which cover the period from the very birth of the subject to the highly developed science as it exists today.

To the soils engineer and geologist the third section will be perhaps the most interesting and valuable, for in it are reprinted some of those Papers which are rightly described in the Index as "The early classics." Amongst them are such Papers as "The effect of minor geologic details on the safety of dams," which was published in 1929 but should still be read by every civil engineer, and also a number of Papers published in the Proceedings of the First International Conference at Harvard in 1936 and elsewhere. All of these have been inaccessible to those who are not in reach of a good engineering library. They demonstrate the masterly contributions which he has made over the years, not only from the laboratory and to the theoretical back-ground of the subject, but also in the field of engineering construction. Among the later Papers published in this section are two of the greatest importance to the practising engineer, that entitled "Mechanics of landslides," published by the Geological Society of America in 1950, which remains the most valuable work on this subject, and that on "Permafrost," published by the Boston Society of Civil Engineers in 1952.

Section IV is devoted to five professional reports, all of interest, but of which perhaps the most remarkable is that on "The design of cofferdams for the proposed Ramapadasaga on the river Godavari."

The book concludes with an exhaustive bibliography of the published works of Professor Terzaghi.



CONFORCE LIMITED

(PRODUCTION GROUP)

6, Egerton Road, LAHORE

Grams : CONFORCE

Phones : { 68758
5792

PRECAST AND PRESTRESSED CONCRETE PRODUCTS

Products

- ★ Transmission and distribution line Poles-Spun
- ☆ Post-tensioned beams
- ★ Pre-tensioned beams
 - ☆ Pre-tensioned double tee floor and roof slabs
 - ★ Precast channel floor and roof slabs
 - ☆ Precast columns
 - ★ Insulated wall panels
 - ☆ Architectural wall panels
 - ★ Cast Stone, sills, coping Hollow Blocks etc.
 - ☆ Miscellaneous

In addition to the above, products can be designed to your specification for a particular project. All items can be quoted either at our plants or erected in place.

Economy

Usually precast and/or prestressed concrete will prove to be the most economical in those applications in which a reasonable quantity of identical units is required. By the use however, of the standard designs shown in our brochures, small quantities will in most cases prove to be economical. One of our engineers will be pleased to visit you and supply designs and quotations on any particular project which you may be planning.

CONFORCE LIMITED

CIVIL ENGINEERS AND CONTRACTORS
REINFORCED AND PRESTRESSED CONCRETE SPECIALISTS

(CONSTRUCTION GROUP)

6, Egerton Road, LAHORE

Grams : CONFORCE

Phones : 68758 • 5792



*United Chemicals Factory Under Construction at Kala
Shah Kaku. Design and Construction by Conforce*



In this issue

| | Page |
|---|------|
| Golden Jubilee Celebrated— <i>Editorial</i> | 3 |
| P.W.D. holds Centenary and Engineering Congress Golden Jubilee | 5 |
| West Pakistan Engineering Congress Elects New Council | 9 |
| Felicitating and Messages of Goodwill | 15 |
| Presidential Address of Mr. A. R. Kazi, President West Pakistan Engineering Congress | 20 |
| President Ayub Addresses the Engineers | 27 |
| Fifty Years of Engineering Congress— <i>A. Rashid Kazi</i> | 30 |
| Engineer—The Nation Building— <i>Mian Abdul Aziz</i> .. | 33 |
| Progress on the Indus Basin Project— <i>Ghulam Ishaq Khan</i> | 38 |
| Salinity and Water-logging in the Indus Basin — <i>Sh. Ahmad Hassan</i> | 42 |
| News and Notes | 54 |
| Recent Books | 62 |
| Index to Advertisers | 41 |