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ABSTRACTS

OF CURRENT LITERATURE

The abstracts which follow are fair summaries of the original literature selected primarily for their interest to irrigation engineers, but no responsibility can be accepted by the Central Board of Irrigation for the accuracy of authors' statements or for their opinions. Abstracts have not been given in some cases where the title is sufficiently indicative of the subject dealt with.

KEY TO ABBREVIATIONS OF JOURNALS.

Abbreviation.	Name of Journal.
Aero. Abst.	Aerodrome Abstracts.
Agri. Engg.	Agricultural Engineering.
Beama Jnl.	Beama Journal.
Build. Sci. Abst.	Building Science Abstracts.
Canad. Engr.	Canadian Engineer.
Civ. Engg.	Civil Engineering (New York).
Civ. Engg. & P. W. Rev.	Civil Engineering and Public Works Review.
Commn. Engr.	Commonwealth Engineer.
Concr. & Const. Engg.	Concrete and Constructional Engineering.
Const. Meth.	Construction Methods.
Curr. Sci.	Current Science.
Dock and Harb. Auth. Engr.	Dock and Harbour Authority.
Engr.	The Engineer.
Engg.	Engineering.
Engg. Jnl.	Engineering Journal (Canada).
Engg. N. B.	Engineering News-Record.
Farm. S. Afr.	Farming in South Africa.
Glen. Gaz.	Glenfield Gazette.
Ind. & East. Engr.	Indian and Eastern Engineer.
Ind. Concr. Jnl.	Indian Concrete Journal.
Ind. Engg.	Indian Engineering.
Ind. Farm.	Indian Farming.
Ind. Jnl. Agri. Sci.	Indian Journal of Agricultural Sciences.
Ind. Rds.	Indian Roads.
Jal. Col. Sci. & Indust. Res., Aust.	Journal of Council for Scientific and Industrial Research, Australia.
Jal. Ind. Soc. Engrs.	Journal of the India Society of Engineers.
Jal. Inst. C. E.	Journal of the Institution of Civil Engineers, London.
Jal. Inst. Engrs. Aust.	Journal of the Institution of Engineers, Australia.
Jal. Inst. Engrs. Ind.	Journal of the Institution of Engineers, India.
Jal. Sci. & Indust. Res., Ind.	Journal of Scientific & Industrial Research, India.
Mech. Engg.	Mechanical Engineering.
Proc. Am. Soc. O. E.	Proceedings of the American Society of Civil Engineers.
Pub. Wks.	Public Works.
Rd. Abst.	Road Abstracts.
Ryl. Engrs. Jnl.	Royal Engineers Journal.
Sci. & Cul.	Science and Culture.
Soil Sci.	Soil Science.
Trans. Am. Geoph. Union	Transactions of the American Geophysical Union.
U. S. Waterways Expt. Stn. Bull.	U. S. Waterways Experiment Station Bulletin.
W. & W. Engg.	Water and Water Engineering.
Wat. Wks. Engg.	Water Works Engineering.

**5—NATURAL SCIENCES, MATHEMATICS, PHYSICS,
CHEMISTRY, ETC.**

1. Calculation of Standard Errors and Tests of Significance of Different Types of Treatment, Comparisons in Split Plot and Strip Arrangements of Field Experiments.—K. R. Nair. (Ind. Jnl. Agrl. Sci., v. XIV, Part IV, August 1944).

528.9—SURVEYING.

Location of Dams.—(Ind. & East, Engr., v. XCVI, n. 2, February-1945). See Abstract No. 143.

532.5—FLUID MECHANICS, HYDRODYNAMICS.

2. Capillary Rise of Moisture in Soil Columns.—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). From observations it is seen that the rate of rise declines with time and the coarser the soil particles, the lesser the total ultimate rise.

3. Basic Experiments for Determining Coefficients for Radial Gates.—(Report of the work done in the Development & Res. Divn., Sind, for the year ending December 1944).

4. The "Spending Beach". Its Influence on Wave Action.—"Helios". (Dock & Harb. Auth., v. XXV, n. 292, February 1945). Deals with the behaviour of waves in the case of a shore with a rigid uniform slope of indefinite extent reaching from a submerged depth of more than say one wave length and rising out of the water to such a height that no wave ever overtops the shore end of it and assuming that there is an indefinitely long series of incoming waves of uniform height and length.

5. Design of Spray Nozzles.—(Engg., v. 159, ns. 4124 & 4126, January 26 & February 9, 1945). Gives the results of investigations regarding the characteristics of the sprays and the design features of the Nozzle. In order to facilitate the application of the experimental results to spray nozzle design the relationships have been presented in the form of nomograms.

6. Effect of Clay Content on the Vertical Movement of Moisture in Soil Columns.—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). The experi-

ment showed that a soil profile containing a higher percentage of clay requires more time for its wetting than the one containing less clay.

532.543—FLOW IN ALLUVIAL AND RIGID CHANNELS.

7. **Design of Channels in Alluvium.**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). From regular discharge observations and silt analysis in the Lower Chenab Canal, it was found that the silt at the centre was appreciably coarser than that near the banks.

8. **Flow in Rivers and Canals.**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). From hydraulic data of Sirhind Canal it was found that the value $P/Q\frac{1}{2}$ was about 1.4 times the normally accepted value (2.67) for regime flow. The silt survey gave for the entire reach a mean size of bed silt of 0.4–0.5 mm. It was deduced that (a) the slopes both at full supply and at half stage would have been generally insufficient to allow silt of this size to be transported, (b) the bed silt in the canal was at least partially generated by scour of its own bed.

9. **Design of Stable Channels in Alluvium.**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). Gives the results of statistical analysis for 54 regularly observed channels for S-Q-m, P-Q and R-Q relationships.

10. **Design of Channels in Alluvium.**—(Annual Report, U.P., P.W.D. (Irr.) Res. Section, Lucknow, for 1944, Tech. Memo. No. 15, March 1945). Data are given and conclusions drawn from 80 observations made in U. P. canals.

11. **Design of Channels in Alluvium.**—(Report of the work done in the Development & Res. Divn., Sind, for the year ending December 1944). Gives an analysis of hydraulic data collected from selected discharge sites along barrage canals during 1944 with reference to the Lacey, King and other formulae.

12. **Flow in Rivers and Canals. Verification of Formula for Afflux and Backwater Curve on an Experimental Channel.**—(Report of the work done in the Development & Res. Divn., Sind, for the year ending December 1944). Investigates the applicability of the backwater equation $L = 3.0565 H^{.34} D^{.36} \text{ cosec } i$ where L = total length of backwater curve, H afflux at the regulator, D = working full supply depth in the channel and i the slope under free flow conditions. The lengths observed agreed fairly well with those calculated.

532.534—SILT AND TRANSPORTED SOLIDS.

13. **Silt Gradation and Characteristics.**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). For plotting silt size distribution, the use of "Log size" in place of "size" has no particular advantage as far as Punjab silts are concerned. By siltometer analysis, the mean diameters at 0.1 D, .6 D and at bed of the main line of Lower Chenab Canal were found to be .104, .110, and .381 mm. respectively showing that the coarser components are to be found in greater frequency near the bed only. The suspended silt is seldom graded to find mean size.

14. **Performance of Anderson Einstein (Modified) Sampler.**—(Report of the work done in the Development & Res. Divn., Sind, for the year ending December 1944). From further observation it was found that the sampler does not appear suitable for a velocity meter. Its use will only be confined to silt sampling.

15. **Comparison of Binkley, Bottle and Anderson-Einstein Samplers in regard to their utility for the purpose of Estimating Silt Proportion contained in any Water Sample.**—(Report of the work done in the Development and Research Division, Sind, for the year ending December 1944). From the results of sampling it is seen that Binkley gives the minimum quantity of silt as compared to the other two. The modified Einstein sampler records more silt than the bottle sampler at surface, but slightly less at .6 depth.

16. **Determination of Bed Load.**—(Report of the work done in the Development & Res. Divn., Sind, for the year ending December 1944). Reports further progress in the experiments on two bed trenches for the determination of bed load.

17. **Silt Surveys.**—(Report of the work done in the Development & Res. Divn., Sind, for the year ending December 1944). Silt surveys are conducted (a) to determine the causes of excessive entry of silt in channels, and (b) to assess the usefulness or otherwise of modifications carried out on the prototype as a result of model experiments.

18. **Study of Transportation of Fine Sediments by Flowing Water.**—A. A. Kalinske and C. H. Hsia. (University of Iowa, Studies in Engineering Bull. No. 29, No. 411, 1945). Experiments were conducted in a rectangular channel with very fine sediment (.011 mm) suspended load and bed. Concentrations of suspended sediment up to 11 per cent. appeared to have no definite effect on the flow characteristics, though the value of the Karman universal constant varied from .32 to .44 without any regular variation. The mean velocity distribution in the centre of the channel followed

the Karman logarithmic curve very well. The suspended sediment distribution for all sizes was practically uniform over the cross-section and no measurable amount was transported as bed load. The relationship between bed and suspended load is discussed.

551.482—STREAMS AND RIVERS.

19. **Studies of Shingle Movements.**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). Gives the results of observation in the Upper Bari Doab Canal and in the river Ravi below Madhopur Headworks.

20. **Accuracy of Different Methods of Taking Discharges.**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). From an analysis of data obtained in the discharge of meter flumes, it was found that the discharge formulae gave discharges agreeing to within 1 per cent. of the actuals. Experiments were also conducted to assess the relative accuracy of current meters, velocity rods, and sharp and broad crested weirs. The velocity rod discharges agreed very well with the current meter values. There was appreciable difference between the weir discharges and those given by other methods.

21. **Accuracy of Different Methods of Taking Discharges.**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). (1) Effect of depth on the relation between velocities taken with a current meter at 0.6 depth (V_{cm}) and a velocity rod whose length was equal to 0.8 depth (V_r).

In the formula $V_{cm} = a + b V_r$ for different depths the value of 'b' was independent of depth while 'a' increased as the depth increased. The average value of b for different depths was .97.

(2) Effect of temperature on the discharge obtained by current meters.

It was found that there was no correlation between the tabular discharge and the percentage difference between observed and tabular discharges.

22. **Accuracy of Different Methods of Taking Discharges. Determination of Co-efficients for Discharges by Central Surface Floats and 0.8 and 0.95 Depth Rods.**—(Annual Report, U.P., P.W.D., (Irr.) Res. Section, Lucknow, for 1944, Tech. Memo. No. 15, March 1945). For the range investigated, i.e., H.M.R. 0.8 to 1.6, the coefficient for central surface floats in pucca sites on canal channels $CD = 0.124 R + 0.71$ where R is the hydraulic mean depth in

feet. For kutchra sites on canal channels the coefficient $CD = 0.205 R + 0.41$. Discharge rods of 0.8 depth in pucca site in canal channels for H.M.R. 0.8 to 1.6 gave $C0.8D = 0.17R + 0.75$. For kutchra site in channels of H.M.R. 1 to 1.8 $C0.8D = 0.23 R + 0.56$. In the case of discharge rod of 0.95 depth in pucca sites on canal channels the velocity coefficient, for H.M.R. 0.9 to 1.6, is given by $C.95D = 0.166R + 0.8$. For kutchra sites in channels in good order the relationship was $C0.95 = 0.146 R + 0.72$.

23. **Mean Silt Point of Channels in Sind.**—(Report of the work done in the Development & Res. Divn., Sind, for the year ending December 1944). Investigations were made to find if there was any fixed point on the central vertical, which would give the average silt charge for the whole cross section. No conclusion was arrived at and the study is being continued.

24. **Relation between Velocity Observed with Current Meters at 0.6 Depth (V_{cm}) and at Surface (V_s) in Rivers.**—(Report of the work done in the Development & Res. Divn., Sind, for the year ending December 1944). Results of statistical examination of the equation $V_{cm} = .7837 V_s + .1017$ are given.

25. **Investigations into the Effect of Temperature on the Rating of Meters.**—(Report of the work done in the Development & Res. Divn., Sind, for the year ending December 1944). The effect of temperature on the rating of a Gurley meter for a range of $16^\circ F$ ($64^\circ F$. to $80^\circ F$.) appears inappreciable and does not show any particular trend.

26. **Relation between Velocity V_{cm} Observed with Current Meter at 0.6 Depth in Terms of the Velocity V_s with Velocity Rod of .8 Depth.**—(Report of the work done in the Development & Res. Divn., Sind, for the year ending December 1944). Results of statistical examination of the equation $V_{cm} = .8727 V_s + .09J3$ are given.

27. **Minimum Time Necessary for Meter Observations in a Channel to get Accurate Estimate of Current Velocity.**—(Report of the work done in the Development & Res. Divn., Sind, for the year ending December 1944). For a Gurley meter, a minimum period of 60 seconds is sufficient and necessary, but a period of 90 seconds is desirable except when the point of observation is 6 in. above bed when a period of 90 seconds is necessary. For Haskel meter, for all depths of submergence except when the point of observation is 6 in. above bed, a minimum of 2 mts. is sufficient and necessary but 2-1/2 mts. desirable; when the point of submergence is 6 in. above bed a minimum period of 2-1/2 mts. is sufficient and necessary but 3-1/2 mts. desirable.

551.491—GROUND WATER.

28. **Movement of Soil Moisture in Canal and Drain Models.**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). The variation of drain discharge with head between canal and drain was investigated. It was found that the discharge in the drain was not proportional to the difference in water level between the canal and the drain. If the canal were closed, a drain within the capillary range cannot remove water from the soil interstices, but can only remove surplus water due to rain or irrigation.

29. **Rate of Rise of Water Table in Rechna Doab (Lower Half).**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). From the previous records it was found that the water table was rising at a steady rate of about 0.75 feet a year. But the present data show that the rate of rise has been decreasing at an average rate of .026 feet per year.

30. **Experiments in Connection with the Determination of the Effect of Capillarity, Moisture and Evaporation on the Water Table as measured by means of Sub-Soil Water Level Pipes.**—(Report of the work done in the Development & Res. Divn., Sind, for the year ending December 1944). Describes experiments in progress.

Water Levels near and Moisture Profile under the Bed of a Channel.—Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). See Abstract No. 87.

Tube Wells.—(Annual Report, U.P., P.W.D., (Irr.) Res. Section, Lucknow, Tech. Memo. No. 15, March 1945). See Abstract No. 82.

Effect of Heavy Irrigation on Subsoil Water Table in Deep Soil Areas.—(Report on the Irr. & Allied Res. at the Poona Irr. & Res. Divn., Poona, for 1944). See Abstract No. 114.

551.5—CLIMATOLOGY, RAINFALL, RUNOFF, EVAPORATION.

31. **Absorption Losses in Basin at Leiah.**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). The results showed that there was no significant correlation between loss and maximum temperature. The correlation between loss and dates is significant. The average rate of the decrease in loss with time is .0086 in. per day. This may be due to the staunching effect of the silt on the basin or the presence of a comparatively impervious layer lower down the profile.

32. **Rainfall and Runoff.**—(Annual Report of U.P., P.W.D. (Irr.) Res. Section, Lucknow, for 1944, Technical Memo. No. 15, March 1945). From a statistical analysis of U. P. data, it was found that (1) floods vary as the catchment area raised to three quarters power rather than to the one half power in like zones, and (2) the relationship between maximum floods and catchment areas differs for different types of catchments.

33. **Evaporation from a Water Surface in Relation to Solar Radiation.**—J. A. Prescott. (From "Trans. Royal Soc. South Australia", v. 64, 1940). Gives a relationship between the measured saturation deficit and estimated solar radiation for Canberra.

34. **Influence of Forests on Rainfall.**—O. M. Martin. (Ind. Farming, v. LXX, n. 10, October 1944). States the general principles of the influence of forests on rainfall.

35. **Calculation of Yield and Percentage of Run Off from Catchments.**—B. Krishna Rao. (Bull. Mysore Engrs' Assn., v. IX, n. 3, July, August & September 1931)

36. **The Measurement of Evaporation from Lakes and Reservoirs.**—(Central Board of Irrigation, Simla. Typewritten, May 1945). Describes the different types of evaporation pans that are in general use in U.S.A.

37. **Rainfall and Runoff.**—(Annual Report of the Indian Waterways Expt. Stn., Poona, for the year 1944). Stresses the importance of making an allowance for the shape of the catchment; it is entirely wrong to apply the Inglis fan catchment formula to elongated catchments without affluents.

Movement of Soil Moisture in Canal and Drain Models.—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). See Abstract No. 28.

Report of the Boston Society of Civil Engineers' Committee on Floods.—(Jnl. Boston Soc. Civ. Engrs., v. XXIX, n. 1, January 1942). See Abstract No. 119.

608.4—HYDRAULIC AND RIVER MODELS.

38. **Automatic Feed for Maintaining a Constant Water Level.**—(Annual Report of the Indian Waterways Expt. Stn., Poona, for the year 1944). In the case of experiments in connection with losses by percolation from the upstream side of a model dam for which the supply required was considerable, it was found that this method of maintaining a constant water level presented considerable difficulties. The note explains why and shows how they can be minimised.

39. **Device to ensure Stilling before Water is let into a Model.**—(Annual Report of the Indian Waterways Expt. Stn., Poona, for the year 1944). A photo of a device developed at the station to ensure proper stilling and to destroy any initial curvature of flow before water is allowed to flow into a model is given.

Model Experiments on a Distorted Model of Head Regulator over Rohri Canal.—(Report of the work done in the Development and Research Division, Sind, for the year ending December 1944). See Abstract No. 107.

621.311.2—GENERATION OF POWER.

40. **Electricity Transmission by the Grid System.**—(Ind. & East. Engr., v. XCVI, n. 2, February 1945). Deals with the advantages of the system.

41. **Electrical Development in India.**—(Ind. & East. Engr., v. XCVI, n. 2, February 1945). Deals with the vast scope in the development of Electrical Energy in India.

Model Investigations Regarding the Project of Mohammadpur Power House.—(Annual Report, U.P., P. W. D. (Irr.) Res. Section, Lucknow, for 1944, Tech. Memo. No. 15, March 1945). See Abstract No. 96.

Post War Reconstruction and Development Schemes of the Government of Madras.—(Superintendent, Govt. Press, Madras, 1945). See Abstract No. 186.

621.6|8—MACHINERY, PUMPS, ETC.

42. **Development in the Construction and Design of Reinforced Concrete Cooling Towers.**—W. V. Zinn. (Civ. Engg. & P.W. Rev., v. XL, n. 466, April 1945).

43. **Mobile Cranes and Material Handling for Civil Engineers.**—(Civ. Engg. & P.W. Rev., v. XL, n. 466, April 1945).

44. **Pipe Lines for Hydro-Electric Installations.**—A. G. Arend. (Beama Jnl., v. 52, n. 94, April 1945). Deals with the selection of best pipe line arrangement in the installations. Discusses the advantages and disadvantages of wooden and steel pipes.

45. **Development of the Centrifugal Pump.**—Sir Richard Allen. —(Ind. & East. Engr., v. XCVI, n. 2, February 1945).

46. **The Execution of Port Works—Machinery and Plant in Connection with Civil Engineering Construction.**—G. M. Burt. (Dock & Harbour Authority, v. XXV, n. 292, February 1945). Deals with plants used for pile driving, cranes, Scotch Derricks, overhead cableways, and pneumatic breakwater.

47. **Principles of Modern Excavation and Equipment.**—K. F. Park. (R. G. Le-Tourneau, Inc., Peoria, Illinois, August 11, 1943). The contents are: equipment choice; opening borrow areas; excavation of materials in borrow areas; fills; solidification of a fill; finishing; elements affecting performance; operating practice—'Dozers'; calculating factors—'Dozers'; typical performance—'Dozers'; calculating factors—scrapers; typical performances per hour—scrapers.

48. **Modern Methods of Raising Water from Underground Sources.**—R. S. Allen and W. E. W. Millington. (Instn. of Mechanical Engrs., London, March 1931). Deals with the centrifugal or turbine type of pump as applied to bore hole work.

C24.13—EMBANKMENTS, EARTH DAMS, SOIL MECHANICS.

49. **Study of Free Surfaces in Earthen Dams by Electrical Analogy.**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). Briefly details the apparatus.

50. **Soil Mechanics.**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). Deals with (a) Effect on seepage in experimental earthen channel, (b) Non-deterioration of compacted soil in experimental channel under 1 : 3 cement plaster overlaid with bricks, (c) Testing of Handa's roller compactor in the field. Experiments were carried out on the bearing capacity of cement concrete. It was found that a 1½ in. thick cement concrete slab 1 : 3 mixture cannot bear a pressure of 8,000 lbs per sq. ft. while a similar slab 1 ft.—0 in. thick can bear such a pressure on compacted soil.

51. **Soil Mechanics.**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). Deals with the effect of salts and clay on the bearing capacity of consolidated soils. Briefly describes the improved apparatus for finding the bearing capacity of compacted soils.

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52. **Testing of Soil Materials for Earth Dam Construction.**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). Briefly deals with the laboratory testing of earth dam materials. The tests are :—preparation of the sample ; mechanical analysis ; compaction ; bearing capacity determinable ; moisture determination ; specific gravity ; percolation ; total solids ; and shear test.

53. **Soil Mechanics.**—(Annual Report of U.P., P.W.D. (Irr.) Res. Section, Lucknow, for 1944, Tech. Memo. No. 15, March 1945). Briefly describes the Pavolovsky and Gilboy methods of tracing the line of saturation in earthen dams. The theoretical lines are compared with the lines obtained by model experiments.

54. **Cross Sectional Area of Earth Dams for Various Heights and Free Boards.**—(Annual Report of U.P., P.W.D. (Irr.), Res. Section, Lucknow, for 1944, Tech. Memo. No. 15, March 1945). Gives the contents of earth dams in cubic feet per lineal foot for heights from 6 to 200 feet inclusive of free boards from 6 ft. to 12 ft. Hydraulic gradient was taken to be 1 in. 4, u/s slope 1 in 2 and d/s slope 1 in 2 to 1 in 4.

55. **Control Measures for Termite Causing Damage to Earthen Embankments.**—(Replies from various Provincial Entomologists, typewritten, 1945).

56. **Fundamentals of Structural Soil Mechanics, Part I.**—C. F. Koerner. (Commn. Engr., v. 32, n. 9, April 2, 1945). Presents a general philosophy of soil action in structural problems—earth pressure, stability of foundations or embankments and the determination of the amount and rate of settlement of foundations under load.

57. **Note on the Diagrammatic Representation of the Mechanical Analysis of Soil.**—J. A. Prescott. (Reprint from Jnl. Ccl. Sci. & Indust. Res. Aust., May 1929). A brief note on representation of a mechanical analysis by a point in a tetrahedron.

58. **Experiments in Connection with Proposed Solani Khadir and Balta Jheel Reservoirs in U.P.**—(Annual Report of the Indian Waterways Expt. Stn., Poona, for the year 1944). For the two dam projects model experiments were done, (1) to trace the effect of various factors on the hydraulic gradient, (2) to see whether the embankment section would be stable under prototype conditions, (3) to estimate the amount of leakage to be anticipated through the dam assuming the soil to be fully compacted, and (4) to see whether the effect of compaction persists or decreases when the dam is saturated. Outlines the alternative designs recommended.

Effect of Dry Bulk Density on the Moisture Movement in Soils.—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). See Abstract No. 161.

An Application of Soil Mechanics to a Bridge Foundation Problem.—E. W. C. Godfrey. (Jnl. Inst. Engrs. Aust., v. 17, n. 3, March 1945). See Abstract No. 61.

Desert Reclamation in Hyderabad.—(Ind. & East. Engng., v. XCVI, n. 2, February 1945). See Abstract No. 144.

62415—FOUNDATIONS.

59. Bearing Piles, Part II.—R. R. Minikin. (Civ. Engg. & P. W. Rev., v. XL, n. 466, April 1945). Deals with the theory relating to driving of the pile with particular reference to weight of the hammer and packing.

60. Bearing Piles—Part III.—R. R. Minikin. (Civ. Engg. & P. W. Rev., v. XL, n. 467, May 1945). This part deals with a few important functions of pile frictional resistance on the surface and a point resistance at the toe of the pile for the three types—the precast reinforced concrete and timber piles, the cast in situ reinforced concrete pile and the screw pile.

61. An Application of Soil Mechanics to a Bridge Foundation Problem.—E. W. C. Godfrey. (Jnl. Inst. Engrs. Aust., v. 17, n. 3, March 1945). It is in two parts: Part I investigates the distribution of stresses on a clay substratum due to pile loadings, the pile being driven into sand overlying the clay and founded with their toes some height above the clay bed. Part II endeavours to show that the stresses so imposed are safe and finally it hazards an estimation of the degree of settlement under the load.

62. Concrete Pile Jetting is Speeded by Three-Lead Driver on Navy Pier.—(Const. Methods, v. 27, n. 4, April 1945). Describes how by the use of jetting, concrete piles were put down to 18—20 feet depths in well compacted sand and gravel at the site of a Navy Pier. After they had been jetted, the piles were set firmly by a few blows from a steam hammer.

Soil Mechanics.—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). See Abstract No. 50.

Soil Mechanics.—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). See Abstract No. 51.

Study of Uplift Pressure on Floors of Regulators Founded on Varying Admixtures of Clay and Sand.—(Report of the work done in the Development & Res. Divn., Sind, for the year ending December 1944). See Abstract No. 109.

624.2|8—BRIDGES.

63. **Pontoons.**—C. E. Fellows. (Civ. Engg. & P.W. Rev., v. XL, n. 467, May 1945). Reviews the development of some types of Pontoon and the principle of its working.

64. **438 Feet Span Welded Truss for Hawkesbury River Road Bridge.**—(Jnl. Inst. Engrs. Aust., v. 17, n. 3, March 1945) Outlines the design of a shop welded, field rivetted truss span.

625.7|8—ROAD ENGINEERING.

65. **Experiments to Improve Usar Roads.**—(Annual Report, U.P., P.W.D., (Irr.), Res. Section, Lucknow, for 1944, Tech. Memo. No. 15, March 1945). With a view to improve the conditions of the canal roads in *Usar*, an experiment was made of laying a 4 in. thick blanket of sand covered with a good soil after removing the same amount of *Usar* soil. The result was encouraging in the beginning. The grass grew on the plot in natural profusion, but after 4 months salts have crept up to the surface.

66. **The Concrete Road.**—F. N. Sparks. (Civ. Engg. & P.W. Rev., v. XL, n. 466, April 1945). Deals with modern methods of providing a really good foundation for the concrete road and of the need for paying more attention to soil conditions. Briefly indicates the results of practical experience. After dealing with the general considerations in connection with road structure the subject is dealt with under the two main heads 'subgrade' and 'concrete'.

67. **Burma Ledo Road.**—(Const. Methods, v. 27, n. 4, April 1945). Very brief details with illustrations are given of the construction of Stillwell road built through jungle and over Himalayan "Hump".

Outline of Development Plan of the Central Provinces and Berar.—(Nagpur Govt. Printing, 18th March 1945). See Abstract No. 188.

Post War Reconstruction and Development Scheme of the Government of Madras.—(Superintendent, Govt. Press, Madras, 1945). See Abstract No. 186.

626.8—IRRIGATION ENGINEERING.

68. Irrigation in India.—C. A. Middleton Smith. (W. & W. Engg., v. 48, n. 588, May 1945).

69. Annual Report (Technical) of Work done in the Indian Waterways Experimental Station, Poona, during the Year 1944.—See Abstract Nos. 37, 38, 39, 58, 120, 121, 122, 123, 124, 125, 126, 127, 128, 135, 136, 137, 145, 148.

70. Report of the Work done in the Development & Research Division, Sind, for the year ending December 1944.—(Stencilled, 1944). See Abstract Nos. 3, 11, 12, 14, 15, 16, 17, 23, 24, 25, 26, 27, 30, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109.

71. Report on Irrigation & Allied Research carried out in the Poona Irrigation & Research Division, Poona, 1944.—(Stencilled, May 1945). See Abstract Nos. 76, 77, 97, 98, 114, 141, 146.

72. Annual Report of the United Provinces, P.W.D. (Irrigation), Research Section, for the year ending 31st December 1944, Technical Memorandum No. 15—March, 1945). See Abstract Nos. 10, 22, 32, 53, 54, 65, 75, 82, 90, 91, 92, 93, 94, 95, 96, 113, 117, 139, 150.

73. Annual Report of the Irrigation Research Institute, Punjab, Lahore, for the year ending December 1944.—(Stencilled, 1944). See Abstract Nos. 2, 6, 7, 8, 9, 13, 19, 20, 21, 28, 29, 31, 49, 50, 51, 52, 74, 80, 81, 83, 84, 85, 86, 87, 88, 89, 111, 112, 115, 116, 133, 138, 142, 149, 161, 162, 163, 181.

74. Quality of Irrigation Water. Effect on Plant Growth.—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). Experiments showed that sodium chloride had a deleterious effect on the growth of tomato plants even if the salt concentration was as low as 30 to 60 parts per 100,000. Sodium sulphate and sodium carbonate did not show any marked effect. Water with total solids up to 120 parts and salt index negative had no effect on plant growth while with positive salt index the plant deteriorated.

75. Stauching of Canals. Usar Lining.—(Annual Report of U.P., P.W.D., (Irr.), Res. Section, Lucknow, for 1944, Tech. Memo. No. 15, March 1945). Tests of Usar lining shows that the lining has been deteriorating with time. The chief cause of this

deterioration is apparently hydrolysis. Due to continuous percolation of water through the lining material the salts as well as sodium have been leached down.

76. **Effect of Sewage Irrigation on the Quality of Crops and Vegetables under Sewage Irrigation.**—(Report on Irr. & Allied Res. of the Poona Irr. & Res. Divn., Poona, for 1944). Vegetables appeared to have suffered from concentrated dose of effluent both in quantity and quality.

77. **Sugar Cane Experiments under Sewage Irrigation, 1943-44.**—(Report on Irr. & Allied Res. of the Poona Irr. & Res. Divn., Poona, for 1944).

78. **Time and Methods Study Speeds Construction.**—C. H. George. (Engg. N.R., v. 134, n. 14, April 5, 1945). Formal methods-study for heavy construction, developed by the T V A, has reduced substantially the time requirements of machines and labour and saved many times the cost of the study. Unit costs of many operations developed from time study are given.

79. **Tungabhadra—India's Most Discussed Project.**—(Ind. & East. Engr., v. XCVI, n. 2, February 1945). Gives a broad outline of the project.

Post War Reconstruction and Development Schemes of the Government of Madras.—(Superintendent, Govt. Press, Madras, 1945). See Abstract No. 186.

Economic Planning for Gwalior.—K. D. Mahadik. (The Alijah Darbar Press, Lashkar, 1944). See Abstract No. 187.

626-811—WELLS, TUBE WELLS.

80. **Tubewells.**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). Describes the apparatus, experimental procedure and the results of electrical analogy methods for the determination of the discharge from tube wells with different lengths of strainer.

81. **Tube Wells.**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). Deals with flow from a canal to a tube well—Mathematical solution.

82. **Tube Wells.**—(Annual Report U.P., P.W.D. (Irr.) Res. Section, Lucknow, for 1944, Tech. Memo. No. 15, March 1945). Deals with the analysis made to study the effect of pumping on the

subsoil water table, specially with a view to determine whether the present rate of pumping is within safe limits in tube well division Badaun. It was found that the pumping had not yet significantly affected the sub-soil watertable and it may be held that the present pumping is within safe limits.

626-82—CANALS, CHANNELS, WATER COURSES.

83. **Design of Falls.**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). Gives the results of investigations of the following designs :—

- (a) Stepped and straight glacis fall,
- (b) Montagu's half gravity parabola fall, and
- (c) Haigh's distributary fall.

84. **Silt Exclusion and Extraction.**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). Experiments were carried out to determine the most suitable dimensions, shape and type of bed for the outfall channel—rough shingle bed ; stone pitched shingle bed ; rough plastered bed ; and smooth bed. In order to examine the various factors affecting silt extraction a series of investigations were made. The determination of the efficiency of a smooth bed representing a lined channel and a silted bed was made. For both the types of bed the tests included, (1) the critical velocity for different grades of silt with varying flume depths, (2) the time required to produce normal silt distribution, (3) the extraction efficiency with various extractor ratios, and (4) the effect of velocities higher than the critical on the efficiency of the extractors with different grades of sand.

85. **Canal Outlets.**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). Determination of a suitable design for a rigid module. Experiments were carried out for converting an open flume and an A.P.M. into rigid modules.

86. **Staunching of Channels.**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). The study included the testing of (1) Masonry linings of bricks, cement and lime concrete, etc., (2) Bitumen linings, bitumen impregnated fabrics and mastics, (3) Joint fillers. The 2 ft.—0 in. and 3 ft.—0 in. thick 1 : 2 : 4 cement concrete slabs gave no seepage up to a pressure head of 20 ft. and withstood the pressure without cracking.

87. **Water Levels near and Moisture Profile under the Bed of a Channel.**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). Gives the results of running the distributary on the water table. Although the distributary was running during May and June there was no change in the water level in the observation pipes during three months while from July onwards the water level rose probably due to the effect of rainfall.

88. **Design of Falls.**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). The best glacis profile is the one giving a maximum addition to the horizontal component of the velocity energy of the stream in a given horizontal length of the work. It was felt that for the profile to be both efficient and economical the horizontal length of the work should be a minimum for a given drop and known crest velocity. A mathematical analysis of such a profile is given.

89. **Silt Extractors on the Upper Jhelum Canal.**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). After discussing the daily observations of silt intensity, and monthly observations of bed silt of Bong and Jaggu extractors, deals with the efficiencies of extractors.

90. **Field Results of Measures adopted after Model Experiments.**—(Annual Report U.P., P.W.D., (Irr.) Res. Section, Lucknow, for 1944, Tech. Memo. No. 15, March 1945). At the regulator at mile 0.2 Fatehpur Branch there was considerable bed and side erosion and long lengths of side pitching failed to achieve any result. Recommendations for warped pitching and a row of staggered blocks were made. The modifications have resulted in more satisfactory conditions of flow. The bed scour below the regulator has been definitely reduced.

91. **The Design of Distributary Heads.**—(Annual Report, U. P., P.W.D., (Irr.) Res., Section, Lucknow, for 1944, Tech. Memo. No. 15, March 1945). From the results of the working of the different types of distributary heads, King's vanes are almost invariably successful in excluding silt from the off-taking channel while the Griffith Cill is an unflinching success when located above a regulator. Very strong effect is obtained with a combination of King's vanes with curved wing and extended platform with under passage.

92. **Design of Falls.**—(Annual Report U.P., P.W.D., (Irr.), Res. Section, Lucknow, for 1944, Tech. Memo. No. 15, March 1945). (1) A study of the Sarda Type Fall and determination of optimum dimensions of cistern D|S.

After reviewing the working of a large number of falls of this type, it is found that practically there is no trouble of bed scour except in some solitary cases ; but there is usually considerable

action due to wave wash D|S of the bigger falls and particularly those with drops greater than 3 feet and sited in light sandy soils. From experiments the formulas are given for depths and lengths of cistern.

(2) Comparison of Sarda Type (vertical drop) and Montagu's (glacis) Falls.

After discussing the conditions of flow, bed scour, side scours dimensions of cistern and cost of the two types, concludes that with the improved transitions and a cistern D|S the working of the two types is equally satisfactory. The design of the Sarda Type seems to be simpler and its construction easier due to the shallower cistern required.

93. To Find out the Best Device for Eliminating Scour D|S of Tennai Aqueduct on Hardoi Branch at Mile 152-7-334.—(Annual Report U.P., P.W.D., (Irr.) Res. Section, Lucknow, for 1944 Tech. Memo. No. 15, March, 1945). After model experiments, the recommendations made were :—Two rows of blocks 1-1/4 ft. \times 2-1/2 ft. in plan and 1-1/4 ft. high to be constructed at 7.5 ft. and 22.5 ft. U|s. of the edge of the existing floor, a length of 25 ft. depressed pitching, slope 1 in 10 to be added to the existing floor, and three end pillars on side curves both U|S and D|S on the aqueduct to be rounded.

94. To Find a Device for Controlling Bed and side Erosion at 3-72 ft. Fall at Mile 5-3-491 of Hamirpur Branch.—(Annual Report U.P., P.W.D., (Irr.) Res. Section, Lucknow, for 1944, Tech. Memo. No. 15, March 1945). The recommendations made were :— (1) The height of the existing baffle wall at 11 feet D|S of the crest to be reduced from 12 inches to 9 inches, (2) A row of 1-1/4 feet staggered blocks (2-1/2 feet \times 1-1/4 feet) to be provided at a distance of 16 feet D|S of the crest, (3) The existing D|S floor to be repaired and an extension of 20 feet with a slope of 1 in. 10 added to it, and (4) The sides just below the bridge to be provided with hyperbolic transitions in masonry and loose stone pitching and the floor to be lowered 1 in 80.

95. To Find a Device for Controlling Bed and side Erosion at Hamirpur Branch 1-96 Feet Fall at Mile 7-3-12.—(Annual Report U.P., P.W.D., (Irr.) Res. Section, Lucknow, for 1944, Tech. Memo. No. 15, March 1945). The recommendations were (1) A baffle wall 1 foot wide and 0-75 feet high to be constructed 11-5 feet below the crest, (2) A row of 1-1/4 feet high staggered blocks (2-1/2 feet \times 1-1/4 feet) to be constructed at a distance of 25-5 below the crest, (3) A length of 20 feet bed pitching laid in a slope of 1 in. 10 to be added and the existing bed pitching repaired, and (4) Hyperbolic transitions to be provided D|S with 1 in 8 expansion and warped from vertical 1 : 1.

96. **Model Investigations Regarding the Project of Mohammadpur Power House.**—(Annual Report U.P., P.W.D., (Irr.) Res. Section, Lucknow, for 1944, Tech. Memo. No. 15, March 1945). The experiments were conducted to determine (1) Proper design of fluming and adequate protection D/S of the draft tube, (2) Conditions to secure uniform flow at the three forebays so that distribution of supplies for the three turbines is equitable and the danger of hunting eliminated at the left turbine, (3) Suitable design of a subsidiary skew regulator and fall at the head of the bypass channel, and (4) The action at the existing Mohammadpur fall when escaping the full canal discharge through the bypass above the power house.

97. **Water Account of Drained Catchment on the Godavari Left Bank Canal.**—(Report on the Irr. & Allied Res. of the Poona Irr. & Res. Divn., Poona, for 1944). About 50 per cent. of the water served to the catchment was utilised by the crops and as much was recovered in the drains. In (artificially) undrained lands water utilised is about 45 per cent. and that recovered in the (natural) drains about 55 per cent. There is thus an advantage in draining lands.

98. **Eradication of Bulrush.**—(Report on the Irr. & Allied Res. of the Poona Irr. & Res. Divn., Poona, for 1944). After recapitulating the previous efforts at the eradication of bulrush, outlines the process of manufacturing paper from bulrush. If this industry is made popular, it is likely to keep bulrush under check.

99. **Field Results of Measures Adopted after Model Experiments in Connection with Skimmer Head for Shahu Branch Ex. Jamrao Canal.**—(Report of the Work done in the Development and Res. Divn., Sind, for year ending December 1944). The skimmer head as tentatively suggested in October 1943 was completed during the closure of 1944. It has proved a success in as much as it gave considerable relief during the first working season after the completion of the work.

100. **Model Experiments in Connection with Group of Regulators at Mile 9.5 of Baghar Canal.**—(Report of the work done in the Development and Res. Divn., Sind, for the year ending December 1944). For remedial measure suggested see Abstract No. 69 of "Abstracts" No. 53. As a result of the modifications suggested the scour hole has mostly silted up.

101. **Further Model Experiments in Connection with Scour Hole Below Head Regulator over Rohri Canal Ex-River Indus.**—(Report of the work done in the Development & Res. Divn., Sind, for the year ending December 1944). The modifications suggested are given in Abstract No. 73 of "Abstracts" No. 53. The tentative modifications carried out have not brought about the silting of the scour hole. Further experiments are indicated.

102. **Basic Experiments to Investigate the Effect on Silt Distribution of (a) Angle of Offtake and (b) Varying Discharge.**—(Report of the work done in the Development & Res., Divn., Sind, for the year ending December 1944). Some of the conclusions drawn are (1) the silt distribution appears to be affected by angles of offtake but not in a regular manner so that no definite trend can be traced, (2) the percentage filament draw off of the offtaking channel for any particular angle increases with the decrease in the total discharge i.e., for $3\frac{1}{4}$ F. S. discharge and $1\frac{1}{2}$ F. S. discharge, but the increase is not in proportion to the increase in discharge, (3) the percentage filaments drawn by the offtaking channel for particular discharge viz., full supply, $3\frac{1}{4}$ supply and $1\frac{1}{2}$ full supply but with different angles of offtake show no definite trend.

103. **Model Experiments in connection with the Reconstruction of the Cross Regulator over Rice Canal at Naudero.**—(Report of the work done in the Development & Res., Div., Sind, for the year ending December 1944). Experiments were conducted to test the design for the downstream protection provided and to suggest means to prevent the scouring tendencies, if any. The modifications suggested are (1) Baffle wall 1 foot 0 in. height at the end of glacis, and (2) the designed deflector to be raised by 1 foot 0 in. Primitive type of "Juckworks" below the pitching in a small length was also recommended.

104. **Model Experiments in connection with Silting of Shahu Branch Ex-Jamrao Canal.**—(Report of the work done in the Development & Res. Divn., Sind, for the year ending December 1944). From model experiments the following were some of the modifications suggested:—(1) The modified skimmer, (2) Curves for left and right side approach, (3) The space between the tail end of the skimmer and the crest of the regulator to be filled up by joining the pavement level of the skimmer with the crest level of the regulator, and (4) For bringing about the silting of the scour hole below the regulator a deflector of 1.5 foot \times 1.03 foot at the end of the pucca pavement.

105. **Model Experiments in connection with Silting of Khipro Minor Ex-Nasrat Branch.**—(Report of the work done in the Development & Res. Divn., Sind, for the year ending December 1944). The suggestions made are the construction of a skimmer consisting of a quadrant of inside radius 10 feet and a straight portion 12- $1\frac{1}{2}$ feet including cut water of double radius and a divide wall of R.C.C. 4 inches, thick and bed protection consisting of 12 inches deep tarungars.

106. **Model Experiments in connection with Scour Hole Below Head Regulator over Rohri Canal.**—(Report of the work done in the Development & Res. Divn., Sind, for the year ending December

1944). As a result of model experiments the modifications described below were finally recommended for adoption :—(a) A deflector 2.5 feet wide with its front edge 22-1/2 feet from the point where the glacis starts ; filling in with stone masonry D/S of deflector and a 2 feet stone masonry wall in front of deflector ; (b) Three rows of staggered blocks 5 feet \times 5 feet \times 82 feet with front row at 140 feet from the end of pucca pavement, spaced 10 feet centre to centre.

107. Model Experiments on a Distorted Model of Head Regulator over Rohri Canal.—(Report of the work done in the Development & Res., Divn., Sind, for the year ending December 1944). Deals with model experiment in which an actual scour was reproduced in a mobile bed to reasonably correspond to the prototype.

108. Further Model Experiments on the Head Regulator over Reservoir Branch.—(Report of the work done in the Development & Res. Divn., Sind, for the year ending December 1944). Experiments were carried out for suggesting a device for reducing the scouring action which would be a regular feature.

109. Study of Uplift Pressures on Floors of Regulators Founded on Varying Admixtures of Clay and Sand.—(Report of the work done in the Development and Research Division, Sind, for the year ending December 1944). No conclusive results could be drawn from the pressure pipe observations conducted.

110. Note of Hydraulic Design of C. D. O. Type Irrigation Canal Falls*.—(Typewritten, June 1945).

Accuracy of Different Methods of Taking Discharges.—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). See Abstract Nos. 20 and 21.

Investigation into the Effect of Temperature on the Rating of Meters.—(Report of the work done in the Development & Res. Divn., Sind, for the year ending December 1944). See Abstract No. 25.

Relation Between Velocity Observed with Current Meter at 0.6 Depth (V_{cm}) and at Surface (V_s) in Rivers.—(Report of the work done in the Development & Res. Divn., Sind, for the year ending December 1944). See Abstract No. 24.

Relation Between Velocity V_{cm} Observed with Current Meter at 0.6 Depth in Terms of the Velocity $V.8$ with Velocity Rod of .8 Depth.—(Report of the work done in the Development & Res. Divn., Sind, for the year ending December 1944). See Abstract No. 26.

Minimum Time Necessary for Meter Observations in a Channel to Get Accurate Estimate of Current Velocity.—(Report of the work done in the Development & Res. Divn., Sind, for the year ending December 1944). See Abstract No. 27.

*Paper presented at the Central Board of Irrigation Research Committee Meeting, August 1945.

626-86 } DRAINAGE, AND LAND RECLAMATION.

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111. Land Reclamation and Waterlogging.—(Annual Report of the Irr. Res. Inst. Punjab, Lahore, for the year ending December 1944). Distribution of reclamation supplies on a channel. Deals with rationing of supplies for reclamation of thur lands.

112. Land Reclamation Section.—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). Briefly describes the progress of Land Reclamation work in the Punjab.

113. Losses from Canals.—(Annual Report of U.P., P.W.D., (Irr.) Res. Section, Lucknow, for 1944, Tech. Memo. No. 15, March 1945). From an analysis of existing data, it was found that losses decreased as the hydraulic mean depth increased.

114. Effect of Heavy Irrigation on Subsoil Water Table in Deep Soil Areas.—(Report on the Irr. & Allied Res. of the Poona Irr. & Res. Divn., Poona, for 1944). Due to the exceedingly slow movement of water in the deep soils, there was practically no reduction in the subsoil water table although the concentration of cane was reduced.

Water Account of Drained Catchment on the Godavari Left Bank Canal.—(Report on the Irr. & Allied Res. of the Poona Irr. & Res. Divn., Poona, for 1944). See Abstract No. 97.

627—RIVER AND FLOOD CONTROL ENGINEERING.

115. River Training.—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). Describes the recently developed methods of river training by means of stone pitched islands. The construction of the island would help to straighten the river in a reach not provided with control points ; but it would take a long time and a number of pitched islands. Construction of pitched islands in the river bed upstream of the guide banks would help to distribute the flow between the guide banks. The pitched islands constructed on a bela on the inside of a curve would help to reduce the intensity of action on the outside of the curve. The pitched island would help to divert the flow from a torrent away from the main river and reduce the concentration of flow from the torrent.

116. Studies in Trends of Specific Gauges.—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944): The specific gauges for 6 sites on river Sutlej and 4 sites on river Ravi were examined. The trends were worked out by considering the two values of the gauge corresponding to a specific discharge on the raising and falling stages of the river in any given year as two consecutive values in a time series. Briefly discusses the results for each gauge.

117. River Behaviour, Training and Control.—(Annual Report U.P., P.W.D., (Irr.) Res. Section, Lucknow, for 1944, Tech. Memo. No. 15, March 1945). Training of River Deoha at Duni Barrage :— Investigations were taken up with a view to obtaining central flow above the barrage and arresting the embayment U|S which was causing considerable action every year on the nose of the left Bell's bund and subsidiary spurs. Another problem to be solved simultaneously was to prevent the outflanking tendency D|S of the barrage on the right bank and U|S of the bar recently constructed below the barrage to counteract the effects of retrogression on the D|S floor of the barrage.

118. Third Report of the Central Advisory Water Committee : River Boards.—(Ministry of Health, London. Cmd. 6465, 1943). After reviewing the administrative system of river control, recommends how best the rivers can be used in the best interests of the whole community. The report is in three parts : Part 1 deals with the existing interests ; Part 2 reviews the evidence recorded ; and Part 3 gives the conclusions and recommendations of the Committee.

119. Report of the Boston Society of Civil Engineers' Committee on Floods.—(*Jnl. Boston Soc. Civ. Engrs.*, v. XXIX, n. 1, January 1942). The report assembles in one volume general information on the recent New England storm rainfalls and floods including descriptions and data, and (2) summarizes the progress of the engineering studies of the flood problem including flood rainfall and run off prediction, determination of design floods, flood routing, and flood frequency.

120. Hooghly River Model.—(Annual Report of the Indian Waterways, Expt. Stn., Poona, for the year 1944). In many places the banks of the river Hooghly are formed of alternate layers of sand and clay. At the outside of sharp bends, where there is a concentration of flow, such sand layers get washed away by eddies in the river combined with flow of water from springs in the bank ; and as a result the over-hanging clay layers may collapse. An eddy then develops in the recessed bank where the slip has occurred and this increases the width and depth of the erosion until eventually the embayment caused by the reverse eddy reaches a natural limit of size and the depth of scour is determined mainly by the discharge

and to a small extent by the material. Additional model experiments were done during the year with the object of improving flow conditions and so reducing scour.

121. Jumna at Deihi Gate Pumping Station : Effect of Constructing a Low Level Weir or Barrage on the Position of the River Near Pumping Station.—(Annual Report of the Indian Waterways Expt. Stn., Poona, for the year 1944). The conclusions drawn as a result of experiments are :—(1) Without a weir the low water channel shifts from year to year and is rarely at the pumping station, (2) Conditions would be similar with a Barrage added some distance down-stream, and (3) With the low level weir a well defined cold weather channel would be obtained at the pumping station.

122. Gandak at Bagaha : Note Explaining why the River Out-flanked the Railway Bridge at Bagaha and Model Experiments to see whether the River can be made to flow through the abandoned Railway Bridge (Oudh and Trihut Railway).—(Annual Report of the Indian Waterways Expt. Stn., Poona, for the year 1944). After reviewing the changes in the course of the river it is concluded that no useful purpose will be served by carrying out model experiments as there is no possibility of the river taking a course along the outside of the right guide bank of the bridge in less than 10 years.

123. Prevention of Further Erosion of the Left Bank of the Experiments Carried out to Evolve a Suitable Design of Pavement—(Annual Report of the Indian Waterways Expt. Stn., Poona, for the year 1944). Since 1938, the Rupnarain river upstream of B. N. Railway Bridge at Kolaghat has eroded 1400 feet of its left bank and by the beginning of 1944, was only 1500 feet from the railway embankment. Describes various methods suggested for preventing further erosion. These were tested in tidal models and the method finally adopted and the results obtained are described.

124. Deep Scour Downstream of the North Western Railway Bridge Over the N. W. Canal at Mile 18-13-4 near Ruk, Sind : Experiments Carried out to Evolve a Suitable Design of Pavement and Side Expansions to induce Accretion.—(Annual Report of the Indian Waterways Expt. Stn., Poona, for the year 1944). The investigation showed that the deep scour was due to return flow at the banks, leading to formation of 'bellies', the return eddies at the banks restrict the waterway and so cause jetting; so if the 'bellies' are prevented much less scour will occur. The bellies can be eliminated by "Jack Work" (brushwood groynes) and accretion will then occur in the bed of the scour hole provided at a suitably low level to induce a return bed roller.

125. Factors Favourable for Opening a New Cut Off Channel.—(Annual Report of the Indian Waterways Expt. Stn. Poona, for the year 1944). When a river bifurcates, three factors deter-

mine whether one or other branch will develop. (1) Curvature of flow upstream, (2) relative slopes downstream of the bifurcation, and (3) relative discharges. Item 2 may win a quick, temporary success, but in the long run favourable curvature nearly always has a delayed victory.

126. **Note on Damage to Lands Bordering the Tapi, Narbada and Sabarmati Rivers.**—(Annual Report of the Indian Waterways Expt. Stn. Poona, for the year 1944). After giving a history of the different floods and devastations caused, it was not considered that the damage along any of these three river was abnormally great for rivers of their magnitude. It was also not considered possible to carry out any training works at a cost which could be justified by the damage which has occurred and in most cases it would appear that the rivers are approaching the maximum swing and the attack will decrease and conditions improve hereafter.

127. **Damage in 1944 to the Surat Rander Road and the City Wall of Surat Downstream of the Hope Bridge and Recommendation to Ameliorate Present Conditions.**—(Annual Report of the Indian Waterways Expt. Stn., for the year 1944).

128. **Cause of Accretion of River Bed at Sukkur Barrage and How to Reduce Rate of Rise, Part I.**—(Annual Report of the Indian Waterways Expt. Stn., Poona, for the year 1944). After tracing the history of the several methods adopted to dispose of the bed silt, concludes that the data shows a steady and alarming rate of rise of water levels since 1934-35. The reason for this is that owing to water being headed up at the Barrage during periods when the discharge exceeds 2 lakhs cusecs, some of the heavy charge of bed material then coming down the river deposits upstream of the Barrage, to be later washed through the Barrage when the gates are opened to pass large discharge; but much of this supercharge of sand deposits downstream of the Barrage. The note deals as to how this accretion can be reduced.

129. **Proposed Substitute for River Valley Authorities.**—J. C. Stevens and W. W. Horner. (*Civ. Engg.*, v. 15, n. 4, April 1945). As the valley authorities are essentially a federally sanctioned dictatorship, proposes river basin agencies known as Basin Development Councils, the chief duty being to prepare the comprehensive plan for the development of the water resources of the river basin in question.

627.2—DOCK AND HARBOUR ENGINEERING.

130. **Floating Drydocks of the U. S. Navy.**—H. W. Hunt. (*Engg. N. R.*, v. 134, n. 14, April 5, 1945). This part deals with methods of building that are unusual in the construction of floating

vessels. Articles on the following appear:—Battleship drydocks built at Pittsburgh: Steel and Timber drydocks at Mobile; Basins adaptable to varied construction; and Small drydocks built on Mississippi.

131. **Coast Defence Against Marine Action.**—P. Suarez. *Dock & Harb. Auth.*, v. XXV, n. 294, April 1945). This part deals with forms and structure of defence works—Longitudinal adherent works, Longitudinal works against impact, and Transverse works or Groynes.

132. **The New Breakwaters at the Port of Leith—Preliminary Model Tests for Design.**—J. D. Easton. (*Dock & Harb. Auth.*, v. XXV, n. 292, February 1945). Describes model experiments conducted (1) to find a satisfactory cross section for the breakwater, so that it would withstand the heaviest storm possible at Leith, (2) to find the most suitable positions of the seaward ends of the two breakwaters to form a new entrance to the port and in such a position as to reduce as much as possible the disturbance of the water in the harbour during storms.

627.43—WEIRS AND BARRAGES.

133. **Weirs on Permeable Foundations.**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). The glacis of a weir has usually a slope varying from 1 in 15 to 1 in 2. The pressure due to subsoil flow being normal to the underside of the weir, it is obvious that if the latter has any appreciable slope the whole of it will not be exerted as 'uplift'. Gives the values of reduction factor for different values of slope.

134. **The Severn Barrage—Technical Report on Notable River Impounding Scheme.**—(*Dock & Harb. Auth.*, v. XXV, n. 294, April 1945). The component works of the scheme are a sluice dam, two navigation locks having a length of 750 feet and a width of 70 feet with a depth of water on the sill of 28 feet at neap tides and 34 feet at spring tides and turbine dams. Brief excerpts from Prof. Gibson's reports on the effect of the barrage on the river flow conditions above and below it are given.

135. **Son at Dehri, Bihar: Protective Measures Below the New Undersluices.**—(Annual Report of the Indian Waterways Expt. Stn., Poona, for the year 1944). The model showed that flow conditions downstream of the undersluices were not severe during

floods as the D/S water level was then high, so that a standing wave forms on the pavement ; but during scouring operations with low discharges in the river hypercritical flow would persist over the downstream pitching which would cause deep scour downstream. First a design consisting of a horizontal pavement downstream of the undersluices with 3 rows of V-shaped teeth and 3 rows of rectangular blocks, was tested. The design was declared ineffective as hypercritical flow persisted on the rigid pavement. After further experiments a divide wall 96 feet in length with tail sloping at 1 and 3—the 1 in 3 sloping tail not being at right angles to the anicut but splayed at 1 in 10—was recommended.

136. **Design of Lower Sind Barrage at Hajipur.**—(Annual Report of the Indian Waterways Expt. Stn., Poona, for the year 1944). Discusses the location of the barrage with reference to sand exclusion. It is essential to build the barrage at a point where natural curvature of flow is most favourable for sand exclusion. Model experiments showed the unsuitability of the site selected by Sind Engineers.

137. **Son Anicut at Dehri (Bihar). Final Note on Sand Excluding Heads for the M. E. and M. W. Canals and Ejectors for the M. W. Canals.**—(Annual Report of the Indian Waterways Expt. Stn., Poona, for the year 1944). Outlines the actual designs adopted for excluding bed silt in both the Eastern and Western channel heads.

627.81—RESERVOIRS.

138. **Silting of Reservoirs.**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). Gives a statistical analysis of the relation between the rate of silting and storage capacity.

139. **Silting of Reservoirs.**—(Annual Report of U.P., P.W.D., (Irr.) Res. Section, Lucknow, for 1944, Tech. Memo. No. 15, March 1945). From observation of the rate of silting and the relation of bed load to discharge, it is concluded that (1) the highest rate of silting is taking place at Pahari and is 28 acre feet per annum per 100 sq. miles of catchment with an average annual rainfall of 34.46 inches, and (2) in the formula $q = KQS$ (where q = average annual bed load in acre feet, Q = average total annual discharge of the river in acre feet and S = average slope of the river expressed as a number) K was found to be 0.1591.

140. Note on Method of Sedimentation and Capacity Survey for Reservoirs of United Provinces.—R. S. Chaturvedi. (Type-written, 30th March 1945).

141. Silting of Reservoirs.—(Report on Irr. & Allied Res. at the Poona Irr. & Res. Divn., Poona, for 1944). Reduction in the capacities of storages known from capacity surveys carried out at intervals gives a correct idea about the rate of silting. In the Dhupdal reservoir it was found that silt under water was more compact than that on the dry bank outside it.

627.823—DAMS AND APPURTENANT WORKS.

142. Dams.—(Annual Report of the Irr. Res. Inst., Punjab Lahore, for the year ending December 1944). Development of photo-clastic methods for stress strain investigation. It was found that the mercury arc lamp was the best source of light for the experiments.

143. Location of Dams.—(Ind. & East. Engr., v. XCVI, n. 2, February 1945). The aid of aerial photography in locating dam sites is briefly explained.

144. Desert Reclamation in Hyderabad.—(Ind. & East. Engr., v. XCVI, n. 2, February 1945). Deals with the construction of Dindi Project. The Dindi Dam is a composite structure, consisting of a masonry Ogee Spillway 1000 feet long in the lowest part of the river bed. The flanking embankments each about 2500 feet long are faced on the upriver side with gently sloping terraces of mortar slabs to prevent erosion and reduce seepage.

145. Present and Future Water Requirements and Supplies in the Jamna at Delhi.—(Annual Report of the Indian Waterways Expt. Stn., Poona, for the year 1944). In 1943, it was tentatively agreed that 2 dams, the Tons and Giri, designed to store one million and half a million acre feet respectively should be constructed. This note deals with the effect which these storages will have on the Delhi water supply.

628—TOWN WATER SUPPLY AND SEWAGE

146. Percolation Waters in Effluent Zone.—(Report on the Irr. & Allied Res. at the Poona Irr. & Res. Divn., Poona, for 1944). The degree of purification attained by utilising sewage for irrigating crops is even higher than that obtained by activated sludge plant.

147. **Ventilation of Sewers by Exhaust Fan.**—J. M. C. Corlette (Civ. Engg. & P. W. Rev., v. XL, n. 466, April 1945).

148. **Proposed Extension of the Water Supply of Eombay by Sir Claude Inglis.**—(Annual Report of the Indian Waterways Expt. Stn., Poona, for the year 1944).

Effect of Sewage Irrigation on the Quality of Crops and Vegetables under Sewage Irrigation.—(Report on Irr. and Allied Res. at the Poona Irr. & Res. Divn., Poona, for 1944). See Abstract No. 76.

63—AGRICULTURE.

149. **Effect of Date of Transplanting on the Yield of Rice.**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). From the experiments it was found that for good yield all transplantation of rice should be completed by the end of July as far as possible and by the seventh of August at the latest.

150. **Water Requirements of Sugar Cane.**—(Annual Report U. P., P. W. D., (Irr.) Res. Section, Lucknow, for 1944, Tech. Memo. No. 15, March 1945). The optimum yield obtained by the most economic use of water was found to be 5" irrigation at four weeks interval; compared with the maximum yield which was given by 5" irrigation at two weeks interval the saving of water was very nearly 50 per cent.

151. **Doubling India's Agricultural Production.**—Sir A. Howard. (The Asiatic Review, v. XL, n. 144, October 1944). Reviews the plan drafted by a special committee appointed by the Advisory Board of the All India Imperial Council of Agricultural Research for doubling the production of the soil of India within a period of fifteen years.

152. **A Preliminary Investigation of the Relative Effectiveness of Various Chemicals in the Control of some Common Weeds.**—C. A. Neal Smith. (Reprint from the "Jnl. of Agr.", June 1938).

153. **Mechanized Rice Growing in New South Wales.**—(Ind. Farm., v. VI, n. 5, May 1945). Rice of lowland varieties without transplantation has been grown on a commercial scale in New South Wales. The note deals with cultural methods—Grading and making check banks, varieties, fertilizers, the weed problem, soil problem, sowing and harvesting.

154. **Irrigation Investigations.**—J. A. Widtsoe. (Utah Agrl. College, Expt. Stn., Bull. No. 105, August, 1909).

155. **The Yields of Crops with Different Quantities of Irrigation Water.**—J. A. Widtsoe and L. A. Merrill. (Utah Agrl. College Expt. Stn., Bull. No. 117, September, 1912). The purpose of the experiments was to discover methods whereby water may be used in the most economical manner. Gives the results of tests made of the actual yields of various crops obtained with different amounts of water.

156. **Methods for Increasing the Crop Producing Power of Irrigation Water.**—J. A. Widtsoe and L. A. Merrill. (Utah Agrl. College, Expt. Stn., Bull. No. 118, September 1912). Gives the results of tests made to determine the best methods of using a definite quantity of irrigation water on a given land surface.

157. **The Effect of Irrigation on the Growth and Composition of Plants at Different Periods of Development.**—J. A. Widtsoe and R. Stewart. (Utah Agrl. College, Expt. Stn., Bull. No. 119, September, 1912).

158. **The Irrigation of Wheat.**—F. S. Harris. (Utah Agrl. College, Expt. Stn., Bull. No. 146, September 1916). The highest yield of wheat was produced with three irrigations of five inches each, applied at the five leaf, the early boot and the bloom stages. Twenty acre inches of water spread over four acres of land produced more than three times as much wheat as where it was all used on one acre.

159. **The Effect of Varying Quantities of Irrigation Water and Manure on the Growth and Yield of Corn.**—F. S. Harris and D. W. Pittman. (Utah Agrl. College, Expt. Stn., Bull. No. 154, April 1917).

160. **Cost of Production of Crops on a Canal Irrigated Estate in the Punjab 1935-36 to 1939-40.**—Labb Singh and Ajaib Singh (Board of Economic Enquiry, Punjab, Publication No. 83, 1944).

Sugar Cane Experiments Under Sewage Irrigation 1943-44.—(Report on Irr. & Allied Res. of the Poona Irr. & Res. Divn., Poona, May 1945). See Abstract No. 77.

Calculation of Standard Errors and Tests of Significance of Different Types of Treatment Comparisons in Split Plot and Strip Arrangements of Field Experiments.—K. R. Nair. (Ind. Jnl. Agrl. Sci., v. XIV, Part IV, August 1944). See Abstract No. 1.

Economic Planning for Gwalior.—K. D. Mahadik. (The Alijah Darbar Press, Lashkar, 1944). See Abstract No. 187.

631.4—SOILS.

161. **Effect of Dry Bulk Density on the Moisture Movement in Soils.**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). A soil at a higher dry bulk density required more time for wetting.

162. **Vertical Movement of Salts in Soils.**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). The reclamation of saline soils is carried out by the application of excessive irrigation to rice. Experiments were made to study the effect of the depth of water table from the surface on the movement of salts. It was found that salts can be removed completely from the top 2 feet and bottom 2 feet of a profile.

163. **Horizontal Movement of Moisture and Salts.**—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). A hard pan below the natural surface would promote lateral movement of moisture and consequently of salts. As the vertically downward movement of moisture and salts is obstructed by the hard pan, the saline areas, which are characterised by a harder stratum at a certain depth from the natural surface, will not be easily reclaimed.

164. **Effect of Mulches on Soil Properties.**—R. E. Stephenson and C. E. Schuster. (Soil Sci., v. 69, n. 3, March 1945). The straw mulch saved moisture equivalent to 2 or 3 inches of rainfall in dry weather. The moisture saving was principally in the upper 2 feet of soil. The trash mulch had a lesser moisture saving effect. Straw and trash mulches increased the organic matter content of the top soil. Both straw and trash caused an increase in waterstable aggregates. The increase in the larger aggregates was most noticeable.

165. **A Comparative Study of the Black Earths of Australia and the Regur of India.**—J. S. Hosking. (From "Transactions of the Royal Society of South Australia", 1935).

166. **A Shaking Machine for the Separation of Sand Fractions.**—R. Smith. (Reprinted from the Jnl. of the Australian Inst. of Agril. Sci., v. 6, n. 4, December 1940).

167. **The Use of Moisture Equivalent as an Index of Texture for Soil Survey Purposes.**—J. K. Taylor. (Reprinted from the Jnl. of the Australian Inst. of Agril. Sci., v. 2, n. 4, December 1936).

168. **Soil Classification and Survey.**—J. A. Prescott. (Reprinted from Report of the Australian Association of Advancement of Science, v. XVIII, 1926). Deals with soil classification—geological, climatic, ecological and physical—soil profile and laboratory investigations.

169. **The Classification and Mapping of Soils.**—J. A. Prescott. (Reprinted from Report of the Australian Association for Advancement of Science, v. XXIII, January 1937). Stresses the importance of correct classification and the method to be adopted.

Effect of Clay Content on the Vertical Movement of Moisture in Soil Columns.—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). See Abstract No. 6.

Note on the Diagrammatic Representation of the Mechanical Analysis of Soil.—J. A. Prescott. (Reprint from Jnl. Cel. Sci. & Indust., Res. Aust., May 1942). See Abstract No. 57.

Capillary Rise of Moisture in Soil Columns.—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). See Abstract No. 2.

631.459—SOIL EROSION.

170. **When Raindrops Splash.**—W. D. Ellison. (Soil Conservation, v. X, n. 3, September 1944). Leaf canopies of the growing crops and mulches tend to reduce only the forces causing splash erosion, while impediments to surface flow tend to reduce only the forces causing splash erosion. Discusses the remedial measures with reference to their effect on both the aspects.

171. **The Problem of Soil Erosion in Australia.**—J. M. Antill. (Civ. Engg. & P. W. Rev., v. XL, n. 467, May 1945). Briefly reviews the different projects that are proposed to stop Australia turning into a dust bowl and a desert.

172. **Fighting Soil Erosion in Britain's Colonies.**—G. M. Roddan. (Soil Conservation, v. X, n. 10, April 1945). Measures taken to repair and prevent the damage done by erosion may be grouped under (1) agricultural ploughing and planting across contours, the use of grass strips and live wash stops, the planting of windbreaks, the use of cover crops, the control of grass and bush burning and the improvement and controlled grazing of pastures, (2) forestry—the establishment of forest reserves and reforestation of denuded or threatened areas, and (3) mechanical—the construction of contour bunds, terraces, stops and dams for the checking of gully erosion and the provision of wells and water supplies thereby removing the need for concentration of human and livestock populations.

173. **Microbiology and Soil Conservation.**—(Soil Conservation, v. X, n. 10, April 1945). Explains how a sound conservation programme must include the best features of all good cultural and cropping practices developed on a firm scientific foundation including the sound principles of soil microbiology.

174. **The Bombay Dry Farming Research Scheme, Sholapur and Bijapur.**—(Annual Report of the Deptt. of Agr. in the Province of Bombay, 1942-43). The system of contour tillage and strip cropping has proved not only very effective in reducing the surface runoff of rain water and consequently in diminishing soil erosion but it has also proved very profitable in yielding higher crop outturns.

175. **A Note on Catchment Afforestation in N. W. India.**—N. G. Pring. (Ind. Farm., v. LXX, n. 8, August 1944). Deals with the role of the forest in affording a sustained subterranean water supply. Stresses the loss of water catchment efficiency through the heavy deforestation of village forests in the catchments of N. W. India and urges that afforestation be included in postwar reconstruction schemes for all provinces and states concerned.

176. **America's New Deal in Agriculture.**—J. K. Taylor. (Reprinted from the Jnl. of the Australian Inst. of Agrl. Sci., v. 6, n. 2, June 1940). The New deal may be summed up as stability and security; a policy of save the farmer and save the soil. The policy had three main aims, (1) Reorganization of the Department of Agriculture, (2) Policy of planned land use, and (3) Reduction of farm taxation and prevention of mortgage foreclosure. Briefly outlines the activities of the Agricultural Adjustment Administration and the soil conservation service in connection with the new deal.

656.71—AERODROMES.

177. **Waterfront Bases for Aircraft—The Design and Planning of Airfields and Airports.**—B. H. Colquhoun. (Dock and Harb. Auth., v. XXV, n. 292, February 1945).

69—BUILDING CONSTRUCTION.

178. Economics of Steel Roofing.—S. McConnel. (Civ. Engg. and P.W. Rev., v. XL, n. 467, May 1945).

179. Hardwood Columns Subjected to Loads of Short Duration.—M. G. Bull. (Jnl. Inst. Engrs. Aust., v. 17, n. 3, March 1945). Presents a relationship between direct and bending stresses at maximum load of Australian hardwoods.

180. Preservation of Timber Sleepers.—(Commn. Engr., v. 32, n. 9, April 2, 1945). Describes the fluorising treatment of Karri sleepers.

Outline of Development Plan of the Central Provinces and Berar.—(Govt. Printing, Nagpur, 18th March 1945). See Abstract No. 188.

Development in the Construction and Design of Reinforced Concrete Cooling Towers.—W. V. Zinn. (Civ. Engg. & P. W. Rev., v. XI, n. 466, April 1945) See Abstract No. 42.

691.3|5—CEMENT AND CONCRETE.

181. Studies on Kankar Lime—(Annual Report of the Irr. Res. Inst., Punjab, Lahore, for the year ending December 1944). The results of experiments to study the effect of the following factors on the tensile strength of kankar lime are given :—(a) Water-kankar lime ratio. The maximum tensile strength was obtained with a mortar containing 35 per cent. water against 24 per cent. required for cement mortar. (b) Fineness—up to a certain stage of fineness the strength improves after which it deteriorates. (c) Addition of different materials—Calcium sulphate—up to 2.5 per cent. increased the strength of lime ; chloride—up to 1 per cent. gave an increase of strength, but further addition weakened the lime ; manganese up to about 0.5 per cent. gave additional strength, (d) permeability of kankar lime briquettes.

182. Prestressed Concrete Design Overseas.—H. Marcus. (Engg. N. R., v. 134, n. 14, April 5, 1945). Reviews the progress made in the use of prestressed concrete in long span beams, slender arch bridges, pipes and piles and water tight caissons.

183. **The Workability of Concrete.**—(Ind. Concr. Jnl., v. XVIII n. 6, June 1944). The workability of concrete is influenced by several factors of which the most important are (a) the proportions of the various ingredients, (b) the grading of the aggregates, and (c) water cement ratio. Explains how these can be correlated.

184. **Lightweight Concrete Aggregates.**—F. M. Lea. (Dept. of Scientific & Industrial Res., London, Building Res. Bull. No. 15, 1944). Deals with the use of pumice, furnace clinker, coke breeze, lightweight slag, expanded clays and shales, expanded slate and expanded vermiculite and concrete aggregate.

MISCELLANEOUS.

185. **Post War Reconstruction and Development Schemes, Government of Orissa.**—(Superintendent, Govt. Press, Cuttack, 1945).

186. **Post War Reconstruction and Development Schemes of the Government of Madras.**—(Superintendent, Govt. Press, Madras, 1945).

187. **Economic Planning for Gwalior.**—K. D. Mahadik. (The Alijah Darbar Press, Lashkar, 1944).

188. **Outline of Development Plan of the Central Provinces and Berar.**—(Govt. Printing, Nagpur, 18th March, 1945).

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