

mix and less carefully prepared concrete foundations under bituminous pavements.

The importance of proper subgrade preparation and drainage need not be discussed here. Good engineering, however, would seem to dictate a policy of thicker concrete where necessary rather than increasing the richness of the concrete throughout in an attempt to attain the same results. Improper subgrade conditions resulting in lack of uniformity in the support of the concrete base, will become more and more evident under the future fast-moving, heavy loads. Without proper support, any base—irrespective of mix and thickness—may and probably will fail.

With greater care in the preparation of the subgrade by thorough drainage and consolidation, there seems no reason for richer concrete base proportions; and conversely, unless these factors are recognized, anything but an unnecessary and wasteful thickness of the concrete foundation will be found inadequate and unsatisfactory.

With a view to determining the consensus of present opinion upon this important highway problem, letters were sent to the state highway departments and to many of the larger cities in the United States, enquiring about their practice.

The following is a tabulation of the replies received over the signatures of the proper officials of the states and cities. Some states failed to reply and others advised that this type of construction has not been used generally because of lack of funds.

States.		Cities	
Mix.	No. of Dept's Using Same.	Mix.	No. of Cities Using Same.
1:3:6	11	1:3:7	1
1:9	2	1:10	1
1:3:5	4	1:3:6	18
1:2½:5	8	1:3:5	3
1:2¼:4	1	1:2½:5	4
1:2:4	2	1:2:4	1

From the above it is evident that the 1:3:6 concrete is the generally accepted standard, and that the use of rich concrete base proportions would be in the nature of an expensive experiment not justified by experience.

## The Engineer's Library

### CONVEYANCE AND DISTRIBUTION OF WATER FOR WATER SUPPLY

REVIEWED BY WILLIS CHIPMAN

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By Edward Wegmann.—Published by the D. Van Nostrand Co., New York; 663 pages, 367 illustrations, 8 plates; 6¼ by 9¼ ins.; cloth; price, \$5 net.

This is the first practical treatise on water works that has appeared for some years, in the United States at least. In chapter I. the consumption of water in American cities is analyzed, and statements given of consumption in European cities, showing conclusively the unnecessary waste that prevails in America. The table of hourly fluctuations will be found of interest.

Chapters II. and III. deal with flow of water in aqueducts and through pipes, and contain some practical applications.

In the chapters on construction, which comprise Part 2, chapter IV. gives valuable information respecting wood-stave pipe, which has been used so extensively in the west. The chapters that follow (V., cast iron pipe; VI., wrought iron and steel pipes; VII., pipes of vitrified stone ware, cement and concrete) will be found of interest.

Chapter VIII., on stresses, is valuable, but might have been expanded to refer to cases of backfilling in soft materials, drawing of sheeting and impact from earth falling from trenching machine buckets.

Chapter IX., flexible joints; chapter X., submerged pipes; chapter XI., gates and valves; and chapter XII., hydrants, contain illustrations and descriptions of standard materials.

In chapter XIII. the intakes and tunnels in many cities in the United States are illustrated, but no reference is made to the hundreds of intakes laid under varying conditions for small towns.

Chapters XIV. and XV., on aqueducts, are of historical interest, and also contain descriptions of the New Croton Aqueduct, the Catskill Aqueduct, the Boston Aqueduct, the Los Angeles Aqueduct, the Coolgardie Pipe-Line, etc.

Service reservoirs are considered in chapter XVI.; and in chapter XVII., reinforced concrete standpipes are described.

Tanks of wood and of steel, and trestles for supporting them, are illustrated and described in chapter XVIII.

Fire protection from fire hydrants (chapter XIX.) and chapter XX. on high pressure water systems are valuable, up-to-date additions to our water works literature. The last chapter (XXI.) in part 2, on distribution systems, disposes of a most complex problem in a few pages.

Part 3, comprises chapters XXII. to XXXII. inclusive, devoted to maintenance and operation.

Chapter XXII. covers service pipes and connections; chapter XXIII., cleaning aqueducts and mains by machines; chapter XXIV., thawing pipes and hydrants. Montreal, Winnipeg and other Canadian cities could furnish interesting examples of additional appliances used for thawing services, hydrants and mains.

Chapter XXV. is devoted to leakage, and might have been greatly expanded with advantage to the water works superintendent.

The durability of mains of different materials is discussed in chapter XXVI., but no reference is made to service pipes and fittings.

Electrolysis is briefly treated in chapter XXVII., and various tools and appliances are described in chapter XXVIII.

In chapters XXIX. and XXX., the prevention of waste is discussed, all too briefly. These chapters are followed by XXXI. on water meters, in which various types are well described and illustrated. There is, however, no mention made of loss of head in meters at different capacities, an important matter in compound meters.

Chapter XXXII., recording instruments, describes standard devices. There has yet to be perfected an automatic apparatus that can be depended upon during extreme cold weather to indicate to a pump-house engineer when a distant tank or reservoir is at the point of overflow.

The standard specification for cast-iron pipes and special castings, of the American Water Works Association, is given as appendix I., and for hydrants and valves in appendix II., and specification for structural steel in appendix III. Appendix IV., automatic sprinklers, which might have appeared as a separate chapter, concisely describes standard practice. In appendix V., fire streams, are incorporated standard tables of flow of hose streams.

This book may not contain everything that the water-works superintendent desires to know, but in it he will find much information of practical use.

### PUBLICATIONS RECEIVED

A HISTORY OF CHEMISTRY.—By F. J. Moore. Published by the McGraw-Hill Book Co., Inc., New York City. First edition, 1918; 292 pages and cover; illustrated; 5½ by 8 ins.; cloth; price, \$2.50 net.

BRITISH COLUMBIA PUBLIC WORKS DEPARTMENT.—Report for the fiscal year 1917-8; 140 pp. and cover, 7½ by 10½ ins. Issued by J. H. King, Minister of Public Works, Victoria, B.C., Includes the reports of A. E. Foreman, public works engineer; Henry Whittaker, supervising architect; John Peck, chief inspector of machinery; D. P. Roberts, inspector of electrical energy; etc.