SEWERS AND DRAINS FOR POPULOUS DISTRICTS: WITH RULES AND FORMULAE FOR THE DETERMINATION OF THEIR DIMENSIONS UNDER ALL CIRCUMSTANCES

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649702817

Sewers and Drains for Populous Districts: With Rules and Formulae for the Determination of Their Dimensions Under All Circumstances by Julius W. Adams

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

www.triestepublishing.com

JULIUS W. ADAMS

SEWERS AND DRAINS FOR POPULOUS DISTRICTS: WITH RULES AND FORMULAE FOR THE DETERMINATION OF THEIR DIMENSIONS UNDER ALL CIRCUMSTANCES

Trieste

SEWERS AND DRAINS

FOR

POPULOUS DISTRICTS;

WITH

RULES AND FORMULÆ

FOR THE DETERMINATION OF THEIR DIMENSIONS

UNDER ALL CIRCUMSTANCES.

BY

JULIUS W. ADAMS,

CHIEF ENGINEER TO THE BOARD OF CITY WORKS, AND CONSULTING ENGINEER TO THE BOARD OF HEALTH, BROOKLYN.

ILLUSTRATED.

NEW YORK:
D. VAN NOSTRAND,
23 MURRAY STREET.
1880.

SMITH & McDOUGAL, ELECTROTYPERS,
82 Beekman St., N. Y.

INDEX.

PREFACE.

IN 1857 the author was charged with the preparation of plans for the sewering of the City of Brooklyn, covering an area of twenty square miles, a great portion of which was then suburban territory. At that date we were totally without data of any kind in this country to guide in the determination of the proper dimensions of sewers for the drainage of cities and towns. No gaugings had ever been made of the discharge of sewers, and the only principle recognized, was to make the sewers large enough to admit of the entrance of workmen to clean them by the use of the pick and shovel; so little had the subject occupied the attention of engineers that it was scarcely thought within their province, in this direction, to do more than to see to the proper construction of what was determined upon by property owners, city surveyors, or municipal councils.

In 1852 the General Board of Health under the Public Health Act had made their first Report to the British Parliament, and advocated very strongly the introduction of smaller pipes in lieu of the large brick and stone drains heretofore in use for house-drainage. Prior to this date (1847) the first Report of the Metropolitan Sanitary Commission, London, appeared, which while not to be taken as advocating exclusively the use of small pipes, yet pointed out the necessity of reducing the dimensions, and altering the shapes of the old stone and brick structures. Embodied in the Board of Health Report above referred to, were tables of the sizes recommended for sewers and drains for specified areas and inclinations, and which claimed to be the result of over twenty years experience in detailed observations of the working of sewers and repeated and multiplied gaugings of the London sewers under all circumstances of storm-water discharges. These tables, issued under such undoubted authority, were calculated to command attention here, and were republished very extensively, indeed wherever works of sewerage were projected in this country, and they were largely instrumental in bringing about the use of burnt clay pipes for sewers,

and in creating the impression (which we cannot say was the aim of the Report) that the business of draining and sewering towns was a very simple affair, and which an attention to the proper use of these Tables would enable almost any one to direct successfully. These Tables did not find universal favor with Engineers, as might be supposed; but the facts embodied in them, being given in evidence before committees of Parliament, could not be gainsaid, however startling some of them might appear, and with a certain class of practitioners they were largely accepted, but for some time past have ceased to be considered as standard; and failing any acknowledged standard, engineers have been left free to adopt such principles to guide them in the dimensions of sewers as their individual judgment might dictate.

Within a few years past (1873) an exhaustive treatise has appeared from the English press, which has passed to a second edition, explaining with much detail the practice of its author in the construction of sewers, and basing his estimate of their discharge upon the hydraulic formula for water discharge from a Reservoir.

This errs as much on the other side, as did the Board of Health Report Tables in its advocacy of extremely small sewers for populous districts; and in other respects, if followed as a standard in this country, it would lead to an aggravation of the very form of nuisance which it was the design to obviate; and still further, the cost of sewerage works (no inconsiderable item in a new country) would thereby be enhanced beyond what the necessities of the locality call for.

In advocating the importance of simplicity and cheapness in works of sewerage we do not mean the use of second rate materials or workmanship, neither of which should find place in any works of sewerage, but we refer to the economy which results from the adoption of methods of design, strictly suited in character, materials and workmanship in the simplest manner, to the end in view.

To illustrate the importance of this economy, we quote from a Report on the Philadelphia sewers published in Van Nostrand's Magazine for 1878, p. 429, wherein it is stated that "the Sewers of that city are designed to carry off one inch of rain per hour, and that the Mill Creek Sewer, draining 3000 acres, requires a diameter of twenty feet for two miles in length. The Heart Creek Sewer draining 2000 acres is from 13 to 16½ feet in diameter for two miles, and

the Honey River Sewer, which will drain over 4000 acres when completed, has already a diameter of fourteen feet, *six miles above its ultimate probable outlet.*" Upon what formula for the discharge of conduit these dimensions were determined we are not informed; but the opinion is given in the Report that the continuation to completion of the works as designed (which are not referred to as by any means fulfilling the requirements of the locality) would be attended with an unnecessary expenditure involving millions of dollars!

As indicating what we regard as the principle underlying a proper system of city sewerage and drainage, we quote from the last edition of "Hydraulic Tables by Neville" (an English engineer of deserved celebrity in his branch of the profession) as follows:

"It is too often taken for granted that the discharge from a catchment basin takes place into the converging channels in nearly the same time that a given quantity of rain falls. The quantity which falls will not be discharged into the channels in the same time. The arterial channels receive the supply at different places, and from different distances, and the water in passing into and from it, does not encounter the same amount of resistance as if it all passed first into the upper end. Less sectional area is therefore necessary than if the whole discharge had to pass through the whole length of the channel, and during the time of fall. The relation of the quantity of rainfall to the portion which flows into the main channel, as well as the time which it takes to arrive at it, and the places of arrival, must be known before the proper size of a new channel can be determined, *particularly sewers in urban districts.*

"A pipe sufficient to discharge the water from 200 acres, need not be of twenty times the discharging power of one exactly suited to ten acres of the same district; for the discharge from the outlying 190 acres, will not arrive at the main in the same time as that from the adjacent ten acres."

We are not aware of the proper recognition of this principle heretofore, and the constant enquiry for detailed information in relation to the system of sewerage pursued in the City of Brooklyn has led to the preparation of this volume, which embodies the principles and practice of sewering towns and cities as illustrated in the successful working of the system adopted there, based upon a recognition of the above principle as enunciated by Neville, and which has proved to be so far successful that an experience of over