

required include requirements for: (1) construction of storm sewers in presently developed areas lacking either storm or combined sewer systems, (2) extensions of existing storm or combined sewer systems into such portions of presently developed areas as are not currently served by these existing systems, and (3) for increasing the capacity of existing storm and combined sewers. Funds required for converting existing combined sewers to separate storm sewer systems, in urban areas which currently have such work underway or committed, are included in the \$13 billion estimate for "present" needs. However, since most localities having combined sewers have not taken a definite stand in sewer separation programs, only a small portion of the total national requirements for combined sewer separation is included in this estimate of "present needs."

A 1964 publication of the U.S. Department of Health, Education, and Welfare,² based upon a Public Health Service survey, states that the total cost for the separation of all existing combined sewer systems in the United States could amount to "\$25 to \$30 billion, or even more." This estimate was based on data obtained in surveying 15 U.S. cities, of various sizes and geographical locations, representing sewer populations totaling approximately 21 million (about one-third of the U.S. population served by combined sewers). The estimate indicates an average per capita cost of \$465 for each of the 59 million persons presently served by combined sewers. It is also stated in this publication² that the estimate of cost is probably too small, since many of the component cost data were based on cost figures prevailing in years prior to 1964.

Local public agencies will also be responsible for a portion of the capital expenditures for storm sewer construction in newly developed urban areas. A portion (in some cases all) of the total cost of major drainage facilities such as sewer mains, trunks, and drainage canals is normally assumed by the local public agency having jurisdiction. The assumption of a portion of such costs by local government is reasonable since storm sewer systems convey runoff from publicly owned lands. A 1955 publication of the Harvard University Press⁷ reports that approximately 50 percent of land in urban areas is used for streets, parks, and other public purposes. Assuming that 25 percent of all such costs are to be borne by local public agencies, then \$3 billion (25 percent of \$12 billion) is the estimated capital need of local government for the construction of storm sewers in urban growth areas.

The total requirements of all local public agencies of the United States for storm sewer construction during the decade (1966-75) is, therefore, estimated to be \$16 billion.

(b) *By Private Land Developers*

Approximately \$9 billion is the estimated need of private land developers for the construction of storm sewers during the decade (1966-75). This amount represents the balance of the \$12 billion need for sewer construction in urban growth areas, not attributed to local public agencies.

² U.S. Public Health Service, Division of Water Supply and Pollution Control, "Pollutional Effects of Stormwater and Overflows From Combined Sewer Systems—A Preliminary Appraisal," Washington, D.C., November 1964; 39 pages; publication No. 1246.

⁷ Bartholomew, Harland, "Land Uses in American Cities." Harvard Planning Series, vol. XV, Harvard University Press, 1955.