

8 percent county ownership, and 34 percent ownership by sewer districts and authorities.

The ownership of drainage facilities along State-owned highways in unincorporated areas are naturally owned and maintained by the respective States.

TABLE IV.—*Ownership of underground and open channel urban storm sewer systems*

Agency claiming ownership	Underground systems		Open channel systems	
	Miles owned	Percent of total reported	Miles owned	Percent of total reported
Municipalities.....	22,968	84	791	58
Counties.....	3,019	11	110	8
Sewer districts or authorities.....	1,474	5	467	34
Total.....	27,461	100	1,368	100

Source: From responses of 80 units of local government replying to a 1966 questionnaire survey by the American Public Works Association.

B. COSTS, CHARGES, AND BENEFITS

1. CONSTRUCTION COSTS

The construction costs of storm sewer systems can best be expressed, for the purpose of a general overall cost analysis, on the basis of a square mile sewered. Since a sewer system installed in one area may be designed under different criteria and constructed of different size conduits, under different ground conditions and of different materials than a system installed in another area, extreme variations in construction costs are understandable. Current construction costs reported by 41 cities widely scattered over the United States in a 1966 questionnaire survey by the APWA, indicate a general variation from \$0.5 to \$2.5 million per square mile of area served, with extreme variations from \$0.05 to \$3.84 million per square mile. A straight average of all responses resulted in a unit construction cost of \$990,000 per square mile. The weighted national average is \$1.55 million per square mile.

Although some of the variation in constructed cost can be attributed to variations in labor costs, labor productivity, material costs and local economic conditions, the major factors producing cost variations are (1) the nature of the local topography, (2) the surface and subsurface characteristics, (3) the precipitation characteristics of the area served, (4) the design criteria selected, and (5) the type of system. (The type of system is defined by whether it is primarily a local collecting system, or whether a large percentage of the total length consists of larger sewers, such as mains, trunks, and large open channels and drainage canals.) The first of these factors, the nature of the local topography, can account for construction costs in rather level areas being higher than costs in hilly areas by a factor of two, three, or even more. The underlying reason for this is that although runoff is greater in hilly areas, much larger pipe sizes are required in flat areas to handle a given flow, since the flow velocities are relatively slow in pipes laid on slight grades. Surface and subsurface conditions also contribute to wide cost differences.