Urban Stormwater Management

American Public Works Association

CHAPTER 15

FINANCING STORMWATER MANAGEMENT

PURPOSE OF CHAPTER

One of the major problems of most local agencies today is the development and operation of a sound and responsive stormwater management program in the absence of an assured and adequate source of funding. Some local agencies have overcome their financing impediments by assessment of user charges to be paid by land-owners. Several agencies have established a stormwater utility for financing and managing surface runoff. This chapter identifies financing needs, the alternative financing methods available to local governments, and describes the experiences and successes of several city and county governments that have adopted the user charge financing method, together with experiences of other communities that have established and operated stormwater utilities.

INTRODUCTION

The public and private costs of operation and maintenance of stormwater control systems is difficult to quantify because complete records of such costs are not readily available. Whatever the annual operation and maintenance expenditures may total, it is generally recognized that relatively few local public agencies carry out a satisfactory operation and maintenance program. Lack of a satisfactory source of funds on a year-to-year basis is the reason. Policy makers generally have not attached a high priority to providing and maintaining local stormwater control systems. It is evident that proper maintenance of stormwater systems should have high priority when one considers that, as of 1978, estimates revealed the nationwide investment in surface drainage facilities alone to be about $60 billion.

Nevertheless, surface runoff problems—flooding, soil erosion, sedimentation and water pollution—must be faced squarely and solved by local officials to reduce annual losses and damages which, in 1978, have been estimated to be about $3 billion.

FINANCING METHODS AVAILABLE

Local agencies have available several means of financing stormwater management needs that cannot be used by private organizations or individuals, and these methods offer great flexibility. But, laws of most states impose various limitations and constraints on implementing these financing procedures. Public officials usually find the most vexing of these constraints to be the approvals required of the residents, property owners, and qualified voters. Such approvals may be expressed in the forms of referendums on proposed capital improvements, consent of property owners within a proposed special assessment district, and statements voiced by local citizens at public hearings. Although many avenues for securing public funds are available, developing successful public financing programs requires thorough study of needs and costs, careful financial planning, public information programs, and fastidious and timely approaches for securing public support and approvals.

Basically, the methods available for local financing of capital needs include: various means of borrowing; current revenues; special revenues; revolving funds and reserve funds; loans, revenue sharing and grants of funds from the federal, state, and county governments and agencies; contributions of land and funds by landowners in accordance with local regulations for platting subdivisions; and, in some places, special user charges.

In new land developments, provision of drainage facilities by the land developers is ordinarily a condition of plat approval. However, complications arise when trunk sewers or large open channels are involved, or where the problems require the provision of up-graded facilities in old, inadequately drained localities. In such instances, the financing possibilities include:

- Creating a special drainage district and levying a special property tax.
- Use of general revenues.
- Special assessments against benefited property.
- Issuing municipal bonds.
- State and federal grants-in-aid.
- Federal loans.
- Voluntary contributions of materials and/or services by land developers.

Motor fuel taxes may furnish part or all of the capital funding when storm drains are included in pavement improvements. Storm drainage, not usually revenue producing, ordinarily is not financed by means of revenue bonds, except when revenues are available from either special assessments or user charges.

Today, local agencies in most places find the "special district" method of financing difficult to implement. Refusal of property owners to cooperate—or court actions—can delay or prevent the successful establishment of special improvement districts. This is unfortunate as the method is highly regarded by purchasers of bonds who favor assessments levied against property rather than persons or organizations. Innovative financing methods are frequently needed.

A unique definition of *benefits* is an aid to Colorado communities in special assessment of runoff control systems. This new definition made possible a broader allocation of property assessments. In Colorado, it is now possible to assess properties located on the hills and ridges, even though such properties may not be in floodplains or flood-prone locations.

USER CHARGES

User charges for stormwater management are becoming more popular with local governments. Cities such as Aurora and Boulder, Colorado, have for several years applied this method for financing both capital needs and operation and maintenance of stormwater systems. Before

adopting the user charge concept, the public agency involved should prepare and adopt a stormwater management masterplan and develop a schedule and cost estimate for implementing and operating the system.

In most places, state-enabling legislation would be required to authorize a charge of this type without voter approval. It appears that agencies wishing to adopt this financing method must either conduct carefully planned public information programs to convince local voters of the need, or take whatever steps are necessary to obviate the need for approval by referendum.

The City and County of Denver, Colorado, has successfully initiated a storm drainage service charge which became effective in January 1981. A prior enactment of the service charge, in January 1974, was rescinded by the City Council only five months after becoming effective. All payments received were refunded. This action was recommended by the City Attorney when a class-action lawsuit was filed against the city. The reason for the failure was the apparent lack of public knowledge concerning the need for, and purpose of, the charge.

Under Denver's newly adopted ordinance, all owners of improved parcels within the 235.6 sq km (81 sq mi) of the City and County of Denver will receive a separate bill annually for stormwater services. Revenues, estimated at $4.7 million annually, will be used for both capital needs and operation and maintenance. The amount of impervious area and the ratio of impervious area to the total area of a parcel determines the rate which ranges between $0.37 to $1.17 per 9.3 sq m (100 sq ft) of impervious area. As indicated in Table 15-1 land use is not a factor in determining the rate.

TABLE 15-1
RATE TABLE FOR STORMWATER SERVICE CHARGE: DENVER, COLORADO

Ratio Group[a]	Rate[b]
0 to .10	$0.37
.11 to .20	0.47
.21 to .30	0.57
.31 to .40	0.67
.41 to .50	0.77
.51 to .60	0.77
.61 to .70	0.87
.71 to .80	0.97
.81 to .90	1.07
.91 to 1.00	1.17

(Minimum annual charge is $3.70/parcel)

a The "ratio group" represents the ratio of impervious surface area of a land parcel to the total parcel area.

b The "rate" for a specific ratio group is multiplied by the amount of impervious area (sq ft) and divided by 100 to determine the annual service charge for a given land parcel.

(Source: Wastewater Management Div., Dept. of Public Works)

Portland, Oregon (Pop. 373,000) initiated a stormwater user charge in July 1977, and began quarterly billing for stormwater drainage. Annual revenues total approximately $2,650,000 from owners or occupants of all property that contributes runoff to a public-drained surface water collection system. Computation of the service charge is different than the method used in Denver. The monthly charge is computed at a rate of $0.615 per 92.9 sq m (1,000 sq ft) of impervious area, the latter being determined using aerial photographs and, sometimes, field measurements. Properties draining directly to rivers or sloughs are exempted from the charge. Portland officials claim that the revenues, which are used for both capital needs and O&M, have provided Portland with an additional, reliable source of funds and a more equitable method of distributing stormwater costs.

Billings, Montana (Pop. 68,300) assesses a "storm sewer service charge" applicable to all property within the city. The amount of the charge, which is billed annually through the treasurer of Yellowstone County, is based upon the area of the lot or parcel and the land zoning class. Some typical service charge rates are given in Table 15-2.

TABLE 15-2
TYPICAL STORM SEWER SERVICE CHARGE RATES: BILLINGS, MONTANA

Zone	Zone Definition	Cost per yr per sq m	Cost per yr per sq ft
P	Public	$0.0086677	$0.00080610
R-150	Residential 15,000	0.0108344	0.00100763
R-60	Residential 6,000	0.013001	0.00120916
RMF	Residential Multi-Family	0.0173354	0.00161221
PD	Planned Development	0.0173354	0.00161221
NC	Neighborhood Commercial	0.0260032	0.00241831
HI	Heavy Industrial	0.0303365	0.00282136
CC	Community Commercial	0.0346709	0.00322442
CBD	Central Business District	0.0346709	0.00322442

(Source: Extracted from Rate Table for Storm Sewer Assessments: Billings, Montana)

Using Table 15-2, computation of the annual charge for a 1,394 sq m (15,000 sq ft) residential property gives $15.11, and for a 1 ha (2.47 ac) community commercial center $347 — both of which appear reasonable.

Annual revenues from the service charge, which became effective in 1978, are credited to the Municipal Storm Sewer System Fund—a separate and special fund. Proceeds of the fund are used for construction, operation, maintenance, depreciation and replacement of sewers used to dispose of storm water, divert it from the sewage disposal plant, and prevent pollution of water supply sources. To obtain sufficient funds to meet needs, revenue bonds are issued by the city — supported by proceeds of the Storm Sewer System Fund.

STORMWATER UTILITY CONCEPT

A new trend in the United States, especially in western sections of the country, is the establishment of single-purpose utilities for managing and financing stormwater

systems. One of the earlier utilities was established in 1968 by the City of Aurora, Colorado, followed in 1974 by nearby Boulder. Stormwater utilities are also operative at Corvalis, Oregon and in Washington at Tacoma, Bellevue, Vancouver, Steilacoom and Clark County.

The City of Boulder, Colorado, finds the "utility" method of generating funds for capital needs in stormwater management to be equitable and excellent. The annual revenues are assured and predictable in amount, factors which are vital to masterplanning stormwater systems and implementing both short-term and long-term stormwater programs. Revenues needed to meet operation and maintenance needs for stormwater management are derived from three sources: (1) Boulder's share of the state sales tax, (2) the city's general fund, and (3) distributions of funds by Greater Denver's Urban Drainage and Flood Control District.

Boulder's stormwater utility serves a city population of approximately 100,000 persons in a 77.6 sq km (30 sq mi) area. Current annual revenues provided by the drainage and flood control fee are approximately $450,000. The fee system has an excellent record in terms of collection. Since January, 1974, the utility has billed owners of all developed property within the city a drainage and flood control fee. Billing is done in conjunction with the monthly billing for water supply. The amount of the fee for each lot or parcel is proportional to several parameters, including:

- Lot parcel area
- Magnitude of the computed surface runoff coefficient
- Site location
- Proximity to floodplains

The rate charged against commercial and industrial land uses is higher than for residential uses; however, the rate charged commercial and industrial properties may be reduced substantially where on-site stormwater detention is provided. Such temporary storage of excess runoff is encouraged by Boulder's agency as a means of minimizing peak discharges of runoff into the public drainage systems.

Determination of the charge to be assessed against a land parcel is made by personnel of the flood control department of Boulder's stormwater utility. This involves making reviews of site plans and engineering calculations to arrive at the monthly charge for each specific parcel. As a basis for calculating the charge, a rate of $1.00/month is assessed for a standard lot area of 650 sq m (7,000 sq ft) having a surface runoff coefficient of 0.43. The charge varies proportionately with lot size and runoff coefficient. The monthly charge thus calculated is multiplied by a factor of 1.5 for property located in a floodplain. Conversely, the calculated charge is reduced if on-site detention storage has been provided.

Boulder uses a large portion of the stormwater utility revenues for capital improvements needed to drain surface runoff and protect against flooding. More revenue is currently needed for construction of major drainageways.

The city of Bellevue, Washington (Pop. 80,000) rates the success of its "storm and surface water utility" as "excellent." Established in 1977, the utility operates within the Department of Public Works. Revenues from the stormwater service charge, which is billed bi-monthly with the water bill, are used both for capital needs and operation and maintenance. All properties within the city are billed the stormwater charge. To provide large amounts of capital, revenue bonds are issued by the city, supported by the service charge revenues and land development fees.

The basis used in Bellevue for determining monthly service charges differs from that used in Boulder. The amount charged by Bellevue's utility against a parcel is proportional to its area and "intensity of development" classification. This classification is based upon percent of impervious area. The five development classes and the corresponding range of percentage imperviousness are: undeveloped land (natural, 0%), light development (up to 20%), moderate development (20% to 40%), heavy development (40% to 70%), and very heavy development (70% +). Increases in the rate schedule were made in May 1980 by ordinance amendment which boosted all rates by approximately 2.7 times the former amounts. Table 15-3 includes several typical rates extracted from Bellevue's Ordinance No. 2842 (adopted May 5, 1980) that amended the rate structure.

TABLE 15-3

DETERMINING STORMWATER SERVICE CHARGE: BELLEVUE, WASHINGTON

Total area of property		Monthly Date by "Intensities of Development Classifications"				
(Sq M)	(Sq Ft x 1000)	Undeveloped	Light	Moderate	Heavy	Very Heavy
0-185	0-2	$ 0.22	$ 0.32	$ 0.43	$ 0.62	$ 0.84
930-1,115	10-12	1.27	1.89	2.54	3.78	5.05
1,300-1,485	14-16	1.67	2.54	3.38	5.05	6.75
1,860-2,045	20-22	2.32	3.48	4.64	6.94	9.26
3,905-4,085	42-44	4.64	6.94	9.29	13.91	18.52
8,000-8,185	86-88	9.26	13.91	18.55	27.81	37.07
9,115-9,300	98-100	10.53	15.80	21.06	31.59	42.12

(Source: Extracted from Rate Schedule of City of Bellevue, Washington)

Annual billings from the stormwater service charge on Bellevue properties total approximately $1,730,000, of which about 95 percent is collected. In some instances, agreement between a property owner and occupant calls for the bi-monthly service charge to be paid by the occupant. Bellevue officials feel that the stormwater management service charge is well accepted by the local public, and that the utility and service charge will continue to serve as the principal means of financing and providing stormwater management in Bellevue.

Tacoma, Washington, (Pop. 165,000) has had a "storm drain" utility since April, 1979. It is structured similar to Bellevue's utility. Land area and intensity of development are the primary determinants, as in Bellevue; however, the rate structure and method of calculating the monthly charges are different. In Tacoma, the area of a parcel is rounded-off to 46.45 sq m (500 sq ft) size increments. The monthly charge for a specific parcel is obtained by multiplying the number of size increments in a parcel by the appropriate rate per 46.45 sq m (500 sq ft) and adding a "fixed" charge of $0.44. The rate schedule is given in Table 15-4. A one-category reduction in rate is granted any

property having an approved on-site detention storage system.

TABLE 15-4
STORM DRAINAGE CHARGE RATE SCHEDULE: TACOMA, WASHINGTON

Category of Development	Rate per 500 sq ft (46.45 sq m)
Undeveloped	$0.02
Light	0.06
Moderate	0.08
Heavy	0.12
Very Heavy	0.16

Source: City of Tacoma Storm Drain Utility

Single-family residential parcels in Tacoma are placed in the "moderate" development category. All such parcels of 1,394 sq m (15,000 sq ft) and less are billed at the specified rate. Single-family parcels larger than 1,394 sq m (15,000 sq ft) are billed at the "moderate" rate for the first 1,394 sq m (15,000 sq ft) and at the "undeveloped" rate for the balance. The fixed charge ($0.44/month) is applied only once per parcel, regardless of area. Thus, for a 1,394 sq m (15,000 sq ft) residential property, the charge is $2.40 ($15,000/500 \times 0.08$) per month, or $34.08/year, with the monthly fixed charge.

The City of Corvalis, Oregon (Pop. 40,000) uses a different approach for determining the service charge using an "equivalent service unit" (ESU) which reflects the amount of impervious area. Based on random sampling and field measurement of properties in various land-use categories, one ESU was taken as 255 sq m (2,750 sq ft) of impervious area—the average impervious area found in sampling single-family residential properties. Multiple-family parcels were found to average 4.8 ESU's and commercial/industrial were found to average 12.5 ESU's.

The monthly stormwater service charge for any land parcel in Corvalis is arrived at by multiplying the appropriate ESU value by $1.60—the adopted rate. Thus, any single-family parcel will be billed a monthly charge of $1.60 (1 ESU $\times$ $1.60), an average multiple-family $7.68/month, and an average commercial/industrial $20.00/month. The revenues are used for both capital needs and O&M. Experience with collecting the service charge has been excellent and there has been no recourse to penalty provisions in the adopting ordinance. Possible penalties include discontinuing water supply service and denial of building and occupancy permits.

The method used by the utility in Aurora, Colorado to finance its stormwater management program involves two separate charges. One is a one-time charge on undeveloped property for which a building permit has been requested. This charge, known as a "storm sewer development fee," is assessed at $1,235 per ha ($500 per ac). The other charge, known as the "storm drainage and flood control fee" is placed against each water meter on the water supply system of the city or on any system to which the city furnishes water or accepts sanitary sewer effluent, where such property is located in the City. The latter charge ranges from $2.65/month for a 1.5 or 1.9 cm (5/8 or 3/4 in.) meter size to $66.25/month for a 30 cm (12 in.) meter. The total annual billing is approximately $1,800,000, almost all of which is collected.

CONCLUSIONS

The user charge and utility concepts are the most dependable and equitable approaches available to local governments for financing stormwater management. Great care should be taken in advance of establishing such a system to assure a legal, beneficial, equitable, acceptable, and effective management agency.

Needs must be fully determined and documented as a basis for developing financing programs. Establishing a rate structure and adopting legislation, management policies and operating procedures will be acceptable to the local public and rulemakers to the extent that foresight and care have been taken in their development. Most important is a thorough, timely and on-going public information program—initiated well in advance of placing the program into operation.