STORMWATER MANAGEMENT FINANCING

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ABSTRACT

The lack of stable and adequate local financing has been identified throughout the United States as a major obstacle to implementation of comprehensive, long-range urban runoff programs.[1] Traditional municipal financing methods have proven to be ill-suited to funding major improvements to drainage systems, their maintenance and operation, and regulation of private sector activities which impact the systems. In many cities, Drainage Master Plans have been prepared only to gather dust on office shelves because of a lack of financing.

This paper addresses major recent changes in stormwater management financing, and describes some of the alternative and innovative approaches which are available to cities and counties in many states. It briefly summarizes a range of financing concepts, and proposes a logical process for development of a drainage financing strategy that is compatible with local program needs.

Criteria are suggested for evaluating various financing alternatives. Examples of stormwater utility rate structures now enacted in several communities are used to describe how different concepts fit local needs and constraints, and how costs are distributed among various types of properties under typical rate structures.

Introduction

Observation of stormwater management programs and conditions in many areas of the United States indicates that two major obstacles stand in the way of achieving effective, comprehensive urban runoff control.
First, a lack of administrative focus prevents most local agencies from marshalling a cohesive and integrated program to address the full spectrum of drainage problems and needs. Responsibility for various aspects of stormwater control are often dispersed among several divisions, departments, bureaus, etc. No one agency or person is accountable for all elements of stormwater management. In most cities and counties. It is often a secondary priority for those involved, something they do in addition to their "real" job during slack periods.

Second, local governments have largely failed to address stormwater management financing. Rarely have they taken a long-range perspective, and provided adequate funding an a consistent basis so that systems can be administered efficiently. Conventional municipal financing methods have failed miserably when it comes to stormwater management. People have not failed so much as the system, and recognition of this has slowly begun to change how local drainage control programs are financed.

This paper addresses only the financing aspects of stormwater management, but the issue of organizational structure and management focus should not be overlooked. Storm drainage is the “bad-penny” of Public Works Departments all over the country. Drainage systems are largely out of sight and out of mind except during severe storms, but (like the bad penny) the problems always return. Ignoring them is useless.

Drainage systems are “orphaned” in the sense that they are commonly thought of as an unwanted appendage to another system. Few agencies are organized so that the person in charge of drainage is concerned directly with stormwater control, rather than indirectly with it due to the effect it has on something else. Operators of combined sanitary sewer systems deal with stormwater only because it impacts the collection and treatment of sewage. Road superintendents build and maintain roadside ditches to protect the integrity of the subbase material under their

streets. It is common for elements of the drainage control program to be dispersed among four or more managers in a city or county.

Consolidation of responsibility is one of the by-products often sought through implementation of alternative financing methods. Adequate financing is needed to make such consolidation feasible. It is generally recognized that both the management and financing obstacles need to be remedied if truly effective stormwater control is to be achieved.

Stormwater management has only recently become a priority issue for many communities. The timing could hardly be worse. Inflation, revenue shortfall, tax revolts, and a seriously deteriorated economy have cumulatively stressed local government financing.

Municipal finance in the United States has become increasingly complex during the past few years. Federal and state programs have contributed to changes (and confusion) in local government financing. Construction programs, categorical grants, and revenue sharing have all complicated local government financing. Transfer payments from federal and state agencies have become an important component of the total revenue package for cities and counties, sometimes dictating local policies, priorities, and choices.

The potential for local government dependency on such financing has become a recognized dilemma, however. The legacy of public works investments, in terms of management and maintenance demands, has been identified as a growing burden for local communities as systems deteriorate or become obsolete.

Federal and state support for urban runoff control has been minimal, however, and limited primarily to program planning and research. The Section 208 program under the 1972 Clean Water Act (PL 92-500) invested heavily in evaluations of water quality problems resulting from urban runoff. Soil Conservation Service and Corps of Engineer's studies and projects have helped to correct some flood problems, mostly of the major river flooding variety. The federal government has otherwise steered well clear of urban runoff. The lack of a federal or state

"carrot" to encourage local investment in drainage programs and projects has influenced local priorities. Predictably, local funds have been channeled primarily to public works activities which would generate federal and/or state matching funds.

A recent analysis of future capital needs for public works indicates that the historical public investment in roads, bridges, water, sewer, drainage and other systems must soon be augmented by a massive reinvestment to preserve and rebuild public facilities.[4] The reinvestment necessary for upgrading and/or replacing local drainage systems is not likely to be financed by federal or state funding, suggesting that the financing capacity and flexibility of local agencies must be modernized to meet these needs, preferably before crises develop. The examples cited in this paper indicate how some communities are doing so.

Development of a Drainage Financing Strategy

A strategy for financing stormwater management in a city or county should provide an overall "game plan" so that the big picture is evident. The strategy should address the full range of program elements needed to achieve the long-term program, with considerations such as timing and local geographical differences incorporated into it. The intent of a financing strategy is to guide development of financial resources in concert with evolution of the drainage program. Thus, the type of financing needed for various parts of the program is important to know in developing the strategy, but a detailed budget is not necessary.

In order to do this successfully, administrators must have a clear (though perhaps somewhat general) idea of what must be accomplished If the local drainage program is to be effective. One method of conceptualizing the drainage program in a form that is useful for financial analysis Is to define the problems, needs, and objectives in terms of the work activities that are required. This "Functional Requirements Analysis" breaks down the drainage program into component parts so that the financing options can be evaluated in relation to various aspects of the long-range

program. A mix of different financing methods is often found to be best for complex programs which include planning, maintenance, construction and various other activities.

It is desirable to make such an analysis compatible with the organizational structure for stormwater management to clarify how financing can fit with the program activities. Table I Indicates categories which might be used in a Functional Requirements Analysis, and Figure I demonstrates how these might fit with a stormwater management organization chart.

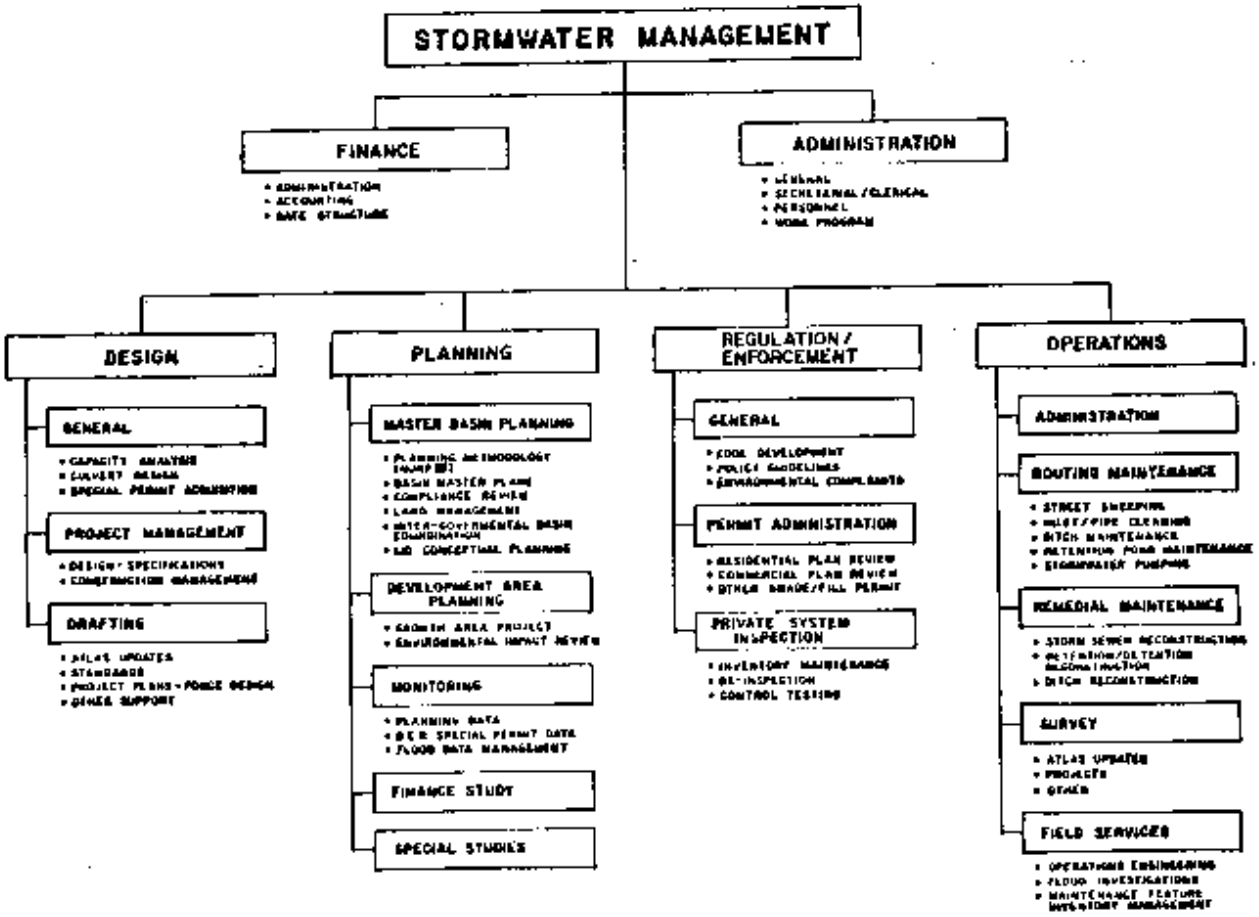
Few local drainage agencies are fully operational in terms of carrying out all the functions that are needed for a comprehensive program. A realistic timetable for implementing various program elements is an important factor in developing a financing strategy. The financing for the program can be incrementally initiated in coordination with the program over several years. This approach is particularly appropriate in communities where a successful track record of improving drainage control must be demonstrated to gain political acceptance and public support, or where legislative action at the state level is needed to authorize the use of some financing methods for stormwater management.

The development process of a comprehensive drainage program suggests that a basic financing source would be appropriate initially, with additional methods possibly implemented later to finance other elements, e.g. capital improvements. A number of other considerations must be factored into decisions regarding a financing strategy, but timing is certainly a prominent concern.

Table 1

TYPICAL CATEGORIES OF FUNCTIONS

Category	Functions
Administration	
	General Administration
	Secretarial/Clerical
	Program Development and Planning
	Personnel
	Capital Outlay and Overhead
Finance	
	Financial Administration
	Accounting and Budgeting
	Revenue Management
	Financial Information Management
Planning	
	Basin Master Planning
	Development Area Planning
	Monitoring
	Studies
Design	
	General Design
	Project Management
	Operations Design
	Drafting
Operations	
	Operations Administration
	Routine Maintenance
	Remedial Maintenance
	Support Services
	Survey
Regulation/Enforcement	
	General Regulation/Enforcement
	Permit Administration
	Private Drainage System Regulation
	Floodplain Management



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Geographical differences may be significant even in a small city. The financing strategy must recognize potential differences in the drainage program that are a function of geographical location. For example, if there is an extreme difference in the need for capital improvements in one drainage basin versus another, financing methods should be evaluated in terms of their capability to differentiate capital costs on a geographical basis. A logical financing strategy will demonstrate a relationship between functional requirements, timing, local geography and the financing methods which together make up the total package. A sensitive strategy can be critically important in generating public acceptance of new financing concepts.

Development of a good financing strategy is neither a quick nor easy task. The financing options must be identified and analyzed. (Criteria are suggested below for evaluating financing alternatives.) Almost inevitably, there are constraints which limit or modify both the program a community can accomplish and the financing methods they can employ. Limited data resources or management information systems may preclude the use of a desirable financing option until better information or a more powerful system is available. The time required for implementation of a financing method may necessitate a delay in the initiation of some part of the drainage program it is intended to finance.

These typical conflicts and inconsistencies between the “vision” of the program and the "reality" of the financing must be resolved so that both are realistic and in tune with each other. A process of "iterative reconciliation" is helpful in producing a best fit between the program and the financing strategy. The program and the financing options are repeatedly compared with each other. Both are adjusted until they mesh properly, and offer the prospect of successful implementation. The process of compromising the two complementary aspects of the program enhances the logic of this approach. This method has been used in several communities, and results in a clearly documented and understandable sequence of steps that staff members, elected officials and the general public comprehend easily.[5]

This process also encourages continuing review and adjustment of the financing strategy. The strategy should be dynamic and responsive to changing stormwater management needs in the community. For example, urban runoff water quality control may become as important as flow control in the future, requiring adjustments in a local financing strategy.

Financing Options

The financing options available to cities and counties include those which are explicitly authorized by state legislation, those available under Home Rule authority, and methods which might require authorizing legislative action at the state level. The options identified in this paper could, of course, be subject to legal challenge and judicial interpretation.

Financing concepts cannot be assumed to be legal in all states, and methods held to be either legal or invalid in another application should not necessarily be considered so for stormwater management.
Since both legislative and judicial actions may limit this application of the various methods of drainage financing, these options require legal review by any jurisdiction considering them. No legal representations are intended or implied by this paper.

Historically, and at the present time, stormwater management has generally been financed using general fund revenue for annual operating expenses and a mix of revenue sources for capital improvements. The level of operational funding in most jurisdictions has only been sufficient to respond to the highest priority needs, and has not allowed comprehensive programs to be developed.

The range of financing options depicted in Table 2 is a contrast to the limited number of funding sources that have been used for stormwater management in the past. The options should be viewed as opportunities to broaden the base of support and balance financial participation in the program, while also localizing costs when it is more appropriate than distributing them city or county-wide.

Table 2

FINANCING OPTIONS

A. Revenue for Annual Operating Expenses

1. General Fund
2. Drainage Utility Service Charges
3. Interfund Loans to Drainage Utility (Transition only)

B. Funding for Major Capital Improvements

1. General Obligation Bonding Repaid by Property Taxes
2. Revenue Bonding Repaid by Utility Service Charges
3. Utility Tax Revenues
4. Community Development Block Grant Funds

C. Fees and Charges

1. Plan Review and Inspection Fees
2. On-site Detention/retention System Inspection Fees
3. Impact Fees
4. System Development Charges
5. General Facilities Charges
6. In-lieu of Construction Charges
7. Latecomer Fees for Developer Extensions

D. Funding for Special Services and Projects

1. Local Improvement Districts
2. Utility Local Improvement Districts
3. Area of Special Benefit Financing
4. Special-purpose Taxing Districts

General Fund.

General Fund revenues may be derived from a number of sources such as property taxes, local sales and business taxes, franchise and other fees, excise taxes, and some licenses. They are used for many municipal purposes, including police and fire services, general administration, support services, property maintenance, court systems, legal services, some public works operations, land use planning, parks and recreation, and various social services.

Elected officials have discretionary authority in allocating the General Fund through the annual budget. Identified municipal responsibilities and political realities tend to define how most of these revenues are spent, however. Some communities view certain functions as essential and virtually non-discretionary. Others are perceived as lesser priorities. For example, a basic purpose of local government is to provide adequate police and fire protection for the community. It is unlikely that a city or county would ever grossly underfund those basic services. On the other hand, stormwater management is usually treated as one of the more discretionary items in a municipal budget if it is financed from General Fund revenues.

It has historically been difficult for programs which focus on long-term, capital intensive, public facilities construction and maintenance to compete effectively in an annual municipal budget process. Several years and a substantial investment in analysis, planning, and design are often required before water, sewer, or drainage facilities are ready for construction. Interestingly enough, drainage remains the only one of these three municipal functions which is commonly financed from the General Fund. Both water and sewer have undergone a transition from general revenue financing to enterprise utility financing in most communities within this century.

There are few explicit limitations on the use of General Fund revenues. They can be spent on both operational and capital expenses, although most often they are used for annual operating costs. Capital outlays which are sometimes paid from the General Fund include equipment and land acquisition, but only rarely major construction. This is because construction projects often require more than one year to complete, which could complicate contracting procedures if General Fund revenues were used.

A present council or commission usually cannot commit a future one to expenditures of general fund revenues, except through bonding. Future General Fund revenues cannot be officially "earmarked". This causes policy makers to be fairly conservative in commitments to multi-year programs that are dependent on general fund revenues. Uncertainty of additional funding in succeeding years to complete projects, and the impact of facility maintenance on future budgets are items of constant concern.

General Fund revenues are often relatively susceptible to economic conditions in the community. Sales tax and excise tax receipts drop during a bad economic slump such as that in 1981 and 1982. Property values may decline leading to reduced tax assessments. Property tax delinquencies tend to increase during periods of recession and high interest rates. At the same time demand for many municipal services (especially police and social services) increases.

Other factors have also recently affected city and county general fund revenues in many states. Tax limitations voted in during the past few years and homestead exemptions from property tax have been reducing property tax revenues. There is also an increasing recognition of differences in individuals' demand for and use of municipal services versus payment for them. In some communities, this has led to a restructuring of both the sources of revenue for General Funds and use of those revenues.

Depending somewhat on the revenue sources of the General Fund, there is little relationship between need or demand for stormwater management and the amount paid by individuals and businesses. Property taxes, local sales and business taxes, and utility taxes normally provide the bulk of general revenues. However, the value of property, value of goods and services purchased, and gross business receipts have little to do with how much a property or individual contributes to urban runoff problems, benefits from their solution, or is served by the local control program.

Insofar as drainage is concerned, financing through the General Fund tends to create an imbalance of costs in comparison to contribution to drainage problems, benefit or services received. The complexity of drainage problems makes it difficult to accurately define who pays a disproportionate amount or receives more in benefit than they may be paying. It is clear, however, that there is no measurable basis of equity inherent in General Fund financing of stormwater management.

User Charges.

User, or "service" charges are perhaps the most quickly growing component of municipal revenues. In the late 1970's, local governments were caught between the rapid inflation of their costs and efforts to restrict taxing authority. The successful passage of Proposition #13 In California ushered in efforts from coast to coast to limit government spending through reductions in property taxes. Another method of limiting local property taxes adopted in several states is the homestead exemption which eliminates property tax on the first $ 10,000 to $ 25,000 of valuation. Such exemptions have further reduced local revenue.

In this atmosphere, user charge and service charge financing began springing up in many areas of the country, for a variety of purposes. Government services which could identify direct users were naturally among the first to apply these concepts. Libraries established admission or check-out fees, more recreational facilities (such as swimming pools) began charging users a fee, and field rentals for organized sports were increased. Numerous other municipal services which were previously provided without direct charge quickly became user-financed.

Although stormwater management has been financed by service charges in some communities for over a decade, more user charge financing for drainage control has probably been implemented during the past three or four years than in all the time previously. In most cases, cities and counties have established enterprise utilities analogous to water and sewer utilities to assume responsibility for drainage.

The Drainage Utility is an innovative concept, but one which fits uniquely well with the program needs in most local stormwater management operations. The functions and costs for effectively managing drainage are similar to those needed to provide water supply and sanitary sewer programs. Administrative, planning, design, construction, maintenance, replacement, and regulatory activities are quite comparable, especially in terms of the long lead-time required for system development and the importance of preventive maintenance. Since water and sewer have been financed through service charges for some time, It is not surprising that drainage "utilities" and service charges have been implemented in the same basic format.

The philosophy behind user charges for stormwater management differs from those for water and sewer service in several ways. Unlike water supply, measurable commodity is not delivered to the customer, the service provided is similar to sanitary sewers (or solid waste disposal) in that something is carried away and disposed of, i.e. stormwater, but quantified measurement is difficult and costly. The demand for the "service" is not comparable to the demand for water supply, since most properties drain onto downhill neighbors fairly effectively without any public system. A broader definition of benefit resulting from service is needed in the case of drainage then for other utilities. Finally, drainage programs are more oriented to solving or mitigating problems than are the other utility functions, which have focused on providing service to clients.

The differences are not as serious as might first be thought, however. Except in most unusual circumstances, sanitary sewerage and garbage are not measured quantitatively to determine individual charges. Rather, sewer charges are often based on water consumption, and garbage rates on the number of cans used rather than pounds and type of refuse.

While demand for drainage service is not as universal as demand for water, nearly all properties use the public drainage systems. Even properties which are not directly benefited in the sense of protection from flooding receive a service from the municipal operation of an adequate and properly maintained drainage system. Those on the top of the hill are provided with a system which safely carries their runoff water away, while those at the bottom of the hill are protected from possible hazards and damages which might occur if the system were not provided. Those in the

middle are served in both ways. All residents and property owners are served when the drainage system prevents flooding of streets, parks and public facilities.

In effect, drainage "benefits" all the properties, but In a broader sense than in the case of other utilities. The upstream. property owners' potential risk of liability is reduced by provision of an adequate drainage system which prevents downstream flooding. The owner in the middle of a drainage basin is protected from uncontrolled runoff from uphill areas and also has a potential liability risk reduced. The person at the bottom of the basin, while not having as great a liability risk, is benefited by the protection a drainage system affords. All of these benefits can be qualitatively identified and estimated if not quantified in precise dollars.

The greatest difference between stormwater management and other utilities is in terms of the problem-solving emphasis. Authorizing legislation in several states and most Drainage Utility service charge rate structures recognize the unique function provided by a drainage program compared to other utilities. Because drainage programs exist primarily to respond to problems, user charges which reflect properties' "contribution to the problem." are the norm rather than ones which reflect service or benefit.

One of the purposes of utility user charges and rate structures is to equitably distribute the costs of the utility program. It has been recognized that charging in relationship to each property's role in creating the problems is at least as equitable as charging for service or benefit. A similar rationale has been used in sanitary sewer rates. Industrial and other dischargers who produce effluent requiring unusual treatment must bear the cost of solving that problem by paying more for treatment or even pre-treating the wastes before they are discharged into the public sewer. At least one state also authorizes counties to base drainage service charges on expected future contributions to problems as well as present ones, allowing undeveloped properties to be charged along with developed parcels.[6]

Most drainage utilities bill user or service charges to public as well as private properties. This is especially important in cases where "contribution to the problem" is a component of the rate structure, since public property such as roads, buildings, and parks comprise as much as 30% of the developed land in some cities. Also, many of the public agencies receive a large portion of their financing from non-local sources such as state and federal revenue

sharing. This tends to spread the cost of the drainage program over an even broader base. It legitimizes the rate structure by treating all properties which contribute to the problem, or are benefited or served, proportionately equally. This meets the usual utility rate test of treating similar customers in a similar manner.

Unlike some of the other financing options, user charges alternative to general fund financing for drainage, rather than just a supplement to it. The other options have a limited clientele group and will not generate sufficient revenue to fund all the necessary functions. User charges, on the other hand, spread the expense of the drainage program as broadly as possible throughout a community, resulting in a relatively low cost for each property owner.

Revenues derived from service charges can be used to pay for administration, planning, design, operations and maintenance, revenue bonds for new construction and replacement of old systems, support services, regulatory functions and virtually anything else required In a drainage program. Rate structures are flexible mechanisms which enable a city or county to tailor the cost distribution to fit the local program and be consistent with other local policies. Finally, drainage utility revenues remain in the utility fund if not spent, rather then reverting for redistribution in the next year's budget, an important factor in long-term program stability.

Financing for Capital Improvements.

Major Improvenents to drainage systems have proven to be the most difficult public systems to finance, both because of the low priority the public places on then (except during and shortly after storms) and lack of truly suitable funding methods. Most of those which have been built were financed by "bonding". Bonding is essentially a public borrowing method whereby money is obtained to pay for an improvement, equipment, and/or associated services (such as construction management) and repaid in future years. It is somewhat analogous to the home loan mortgage method of financing housing.

Historically, most drainage system Improvements financed through bonding have been General Obligation Bond projects, with repayment guaranteed by the full credit of the City or County issuing the bonds. This essentially

means that all non-dedicated revenues can be used to pay the debt. In most states, G.O. bonds are directly financed by an excess levy of property taxes on an ad valorum basis. Only if the revenues of the excess levy are insufficient, perhaps due to property tax delinquencies, would other revenues be used to supplement the bond fund, but in most cases the bondholders have a first priority on those other revenues if necessary.

In areas where drainage has been organized and financed as an enterprise utility, capital improvements may be funded through "revenue" bonds.[7] Such bonds are repaid primarily from the service charges, although other fees and charges can be earmarked to pay off revenue bonds also. G. O. bonds may also be used for utility projects in many states.

In recent years, cities and counties have also used Utility Tax revenues and Community Developpent Block Grant funds to construct capital improvements. Utility taxes are levied on utilities operating within a municipality, including one or more of the following in most jurisdictions: telephone, electricity, natural gas, water, sewer, solid waste, fuel oil, cable television, and drainage. Community Development Block Grants are shared revenue distributed to the local jurisdictions for use in "target" areas to attack neighborhood deterioration and provide public facilities for low and moderate-income residents.

General obligation bonds usually authorize collection of an excess property tax levy to fund specific municipal Improvements. They have been used for many purposes in the past, though use of them for utility projects has diminished with greater acceptance of revenue bonds. G. O. bonds normally require a voted approval, though requirements vary from state to state. Some states allow elected city councils or county commissioners to approve general obligation bonds up to a limited percentage of total assessed valuation without a vote.

Because they are backed by the full credit of the local government, G. O. bonds normally receive the most attractive (lowest) interest rates of any municipal borrowing instrument. They can be issued with varying maturities and other provisions which may affect their marketability and the interest rate they must pay.

Revenue bonds do not authorize an increase in taxes, nor do they usually authorize a specific increase in utility service charges. If necessary to support the bonds, a rate increase is normally enacted separately. It is possible to use service charge revenues from throughout a service area to repay revenue bonds or to specify that only revenues from one area or oven certain properties be used for the bond payments. In most cases, it is best to place few limitations within the bond ordinance which relate to revenue sources, while still being consistent with financing philosophies and policies in the local community. This provides the bondholders with some assurance of payment, and may result in a lower interest rate.

Cities and counties in most states may issue revenue bonds without a public vote, since ad valorum taxation is not affected by the debt service needs. Although typically the bonds are repaid from the regular service charge revenues, municipalities may also establish system development charges, hook-up fees and other financing methods and earmark those funds for repayment of the revenue bonds. This reduces the revenue required from the standard service charge by the amount generated by the special fees and charges, and ensures that developing properties help pay for the project.

Revenue bonds have been used by water and sanitary sewer utilities to finance improvements for a number of years, but drainage utilities are relatively new and only a few have sold revenue bonds. Until the bond market becomes more knowledgeable about the revenue systems for drainage utilities and a longer track record is established, it may be advisable to issue combined utility bonds which incorporate drainage revenue bonds with water and/or sewer revenue bonds. This approach was used in Bellevue, Washington for the sale of approximately $ 10,000,000 of drainage utility revenue bonds, and a very good interest rate was obtained because of the size of the combined issue and the inclusion of the water and sewer bonds which had a lengthy revenue history.

Fees and Other Charges.

Municipalities in most states have general authority to establish fees and charges of various types to cover operational expenses related to a specific activity or function, particularly if the charges are directly related to a

service for a specific client, Often such fees are associated with issuance of a permit. For example, building permits and water connection permits are normally scaled to reflect the service demands that the client places on the public agency. In most cases these fees are earmarked to be deposited directly into the fund which supports the function. Plan review and inspection fees are a standard financing mechanism in most local governments today. Many municipal jurisdictions use fees to fund drainage regulation and enforcement efforts such as drainage system plan review, field inspection, and erosion and sediment control. Collection of these fees is often facilitated by permit or "sign-off" requirements needed for projects to proceed. Some agencies attempt to make plan review and inspection financially self-sufficient through the fees, while others subsidize these functions partially out of General Fund revenues to encourage development. Regardless of the philosophy behind this type of fee, the affect of it is to make the developers bear some or all of the cost of the public services related to their projects.

Most drainage plan review and inspection is related to the design and construction of on-site drainage systems, either for detention/retention or conveyance purposes. Several different approaches are used to calculate the amount of the fees. A fee ordinance may establish the charges based on the average cost of providing plan review and inspection functions, using assumptions about how many reviews and inspections will be made during the year. Flat fees are most common, with the charges varying only by category of project rather than from project to project within a given category.

Some jurisdictions have begun to charge hourly rates for drainage plan review and inspection because of the variation in time required from project to project. This approach causes a project which demands more staff time to pay a higher fee, while the well-designed and well-managed jobs pay less. One of the best ways to administer this type of variable fee is to require a deposit at the time of application for permits against which “fee draws” are made to cover the costs of plan review and inspection. If the account is drawn down to a specified minimum level, it must be brought back up to a required base or a stop work order is placed on the job. All of this should be carefully detailed in a fee ordinance if this type of charge is used to ensure that the staff has appropriate guidance and authority in administering variable charges. Variable charges can be a sensitive issue, and require careful definition and administration.

The fee basis commonly used for building permits (the value of the improvement) has not been widely applied to drainage plan review and inspection. The construction cost of various types of on-site detention systems has little to do with the amount of plan review and inspection time required of the staff. For example, ponding in a parking lot of a retail center can be an inexpensive method of meeting detention requirements, but the review and inspection to verify the design and construction is fairly time consuming, especially in terms of field work.

Inspection fees may also be used for other enforcement functions. Private on-site detention systems are rarely maintained in proper working condition by the owners, yet downstream public systems are designed and operated on the assumption the private systems will work properly during storms. Annual inspections of private on-site systems can identify needed maintenance before problems result, but they are relatively expensive to carry out on a regular basis. Annual fees charged to properties with on-site systems can be used to finance an inspection program.

Five other types of fees and charges may be particularly appropriate for stormwater management, although they are not yet widely used. They are:

1. Impact Fees;
2. System Development Charges;
3. General Facilities Charges;
4. In-lieu of Construction Charges; and,
5. Latecomer Fees for Developer Extensions.

Impact fees began as a response to the realization that construction and land development may have significant impacts on a neighborhood or even an entire community. Environmental reviews and impact statements required by the federal government and some states beginning in the late 1960's fostered a concern not only for the environmental effects of growth, but the economic implications as well. Congested highways, crowded schools, larger water and sewer facilities, increased urban runoff and pollution often translate into higher property taxes to upgrade municipal systems in response to problems. Impact fees have been perceived as a mechanism to make

growth "pay it's own way" by participating in the cost of new facilities at the front end of a project rather than indirectly through long-term enhancement of the tax base and increased local employment.

The concept became popular with established residents in many areas who saw not only the opportunity to shift the expense of direct impacts of new growth, but also a method for obtaining community improvements which would be paid for primarily by newcomers moving into the area. It was reasoned that developers would simply pass through their impact fee expenses in the form of higher housing costs and other prices.

During the late 1970's, when the economy was strong, developers did little to discourage the use of impact fees. The fees were generally viewed as preferable to project delays or entanglements with activists or community groups. In more difficult times the fees have proven to be only a minor deterrent to growth. During recessions, impacts are sometimes overlooked because the potential benefits of development overshadow the possible problems posed for a community.

A tendency developed in some areas to overwork the impact fee concept, burdening new development with all manner of costs. Developers were expected to bear the cost of expanding sewer treatment plants and even upgrading them to secondary or advanced waste treatment. Street improvements were required to meet increasing traffic load projections. Recreational facilities were mandated. Drainage retention or detention facilities sized to solve flooding problems which had existed for years were required. In some cases, the actual purposes of the fees were not clearly defined. They were treated as a general impact relief fund to help a city or county respond to unspecified future problems.

It was predictable that abuses of the impact fee concept would spawn legal challenges. The use of impact fees in several states has been clarified in legislative action and court rulings[8] which address the criteria that an appropriate impact fee should meet. Case law would suggest that impact fees should directly relate to the effects that a specific project will have, and that the fees should be earmarked to remedy that particular impact. Failure to do so may result in an impact fee actually being a tax instead of a fee, which may be beyond the authority of a city or county.

While they may limit the use of the impact fee concept, officially adopted criteria probably offer the best prospect for judicial acceptance of impact fees. For example, a Drainage Impact Fee Ordinance which defines specifically what impacts are to be considered, how they should be estimated, how charges would be assessed, and how the funds would be earmarked to mitigate the impacts could be legally and politically acceptable. Since new development affects both the capacity requirements of drainage systems and the need for routine maintenance, impact fees are justifiable for both capital improvements to drainage systems and maintenance of them during and immediately after construction.

Impact fees are sometimes confused with the other types of special fees and charges cited in this paper. Care should be taken to differentiate between impact fees, which are associated specifically with the impact of a project, and the general need for new facilities to serve the community. New developments are an important factor in the need for new or vastly upgraded facilities of many types, but rarely does a single project alone generate the need for a new facility.

System development charges (SDC's) have been used by municipal utilities, especially water purveyors, for a number of years as a method of financing improvements. They have been known by several titles other than “system development charges”, e.g. utility expansion charges and extension and improvement charges. In recent years, cities and counties have begun to use SDC's for other purposes, including sewer interceptors and drainage systems. System development charges differ from other similar charges, such as "general facility charges", in that they are associated with specific improvements and are often levied on new developments after the improvements are constructed as a means of balancing financial participation.

Communities must frequently install suitable water, sewer, and drainage systems in anticipation of growth. Existing property owners do not always feel that they can or should bear the cost of improvements which are needed to facilitate growth. System development charges enable communities to meet the increasing demands on systems which accompany growth pressures. The SDC resembles the latecomer fee for developer extensions which is

explained below, in that the intent is to enable a community to achieve excess capacity improvements in advance of growth, yet place an equitable portion of the cost on those properties which later develop and make use of the extra capacity that was built into the system.

Several approaches have been used for system development charges which reflect slightly different philosophies and purposes. Some jurisdictions levy a SDC as a lump sum at the time development approvals are sought. The funds are deposited in earmarked accounts for the stated purpose(s). For example, a developer of an office-warehouse complex might be charged a SDC for prior upgrading of water reservoir capacity to assure proper fire flow which was initially paid for through a revenue bond. The system development charge revenues would be placed in that revenue bond fund.

Most often SDC's have been used to help pay for facilities which improve or expand utility service to a portion of the total service area. Typical projects financed wholly or partially by SDC's include supplemental water supply and excess transmission and reservior capacity for fire flow purposes. Regional detention/retention facilities would be an appropriate drainage project for SDC funding.

When revenue bonds (supported by drainage utility service charges) are used to finance drainage Improvements. SDC's can ensure that all properties equitably participate in the financing of the capital improvements. Major drainage improvements are normally sized with future development in mind and have a useful life at least two or three tines as long as the bond maturity. One purpose of the SDC concept is to ensure that the properties which develop after the bonds are sold also help to pay for the improvements. SDC's should be consistent with the amount paid by developed properties when the improvements were constructed.

The details of a SDC incorporated into drainage utility financing are often largely determined by the rate structure which provides revenues to repay the bonds. If undeveloped properties are charged a drainage utility service charge which includes the cost of capital improvements, the rate structure can be balanced so that a SDC nay not be needed. On the other hand, if undeveloped properties are not billed a service charge, a SDC nay be desirable. SDC charges

levied when a property develops should approximate the total that the property would have paid into the improvement bond fund had it been developed at the time the bonds were sold. This type of SDC allows property owners to defer paying for capital improvements to the drainage system until development occurs, but ensures that all properties which utilize the improvements participate in their cost.

The SDC provides a rational financing method which responds to the sensitive issue of who pays for oversizing to accomodate future growth. Care must be taken, however, not to place too much confidence on future growth as a revenue source. If the growth slows or does not occur, the existing developed properties might have to pay a larger service charge in the future to cover the shortfall of SDC revenue. Unanticipated increases in service charges due to SDC shortfalls can erode a utility's credibility with the public, and should be avoided through conservative projections.

General facilities charges are similar to the SDC concept, although they are more often used for overall improvement to a system, or for maintenance or replacement than for specific capital improvements. This method of financing is most often used when improvements which will benefit an entire service area are involved. For example, a new filtration system for a water supply treatment plant might be paid for through a combination of revenues from the basic service charge and a general facilities charge imposed on new developments. Another use of general facilities charges might be when an entire system has been upgraded over several years on a "pay as you go basis" financed by a short-term surcharge on the utility rates. The charge in this case would ensure that properties developing after the improvements were completed would share the cost with the rest of the community.

If a community has sufficient drainage utility service charge revenues that improvements made to the drainage system can be paid for directly out of revenues rather than through bonding, general facilities charges can be used to balance the financial participation. For example, if all improvements to the drainage systems are oversized for future conditions but undeveloped properties are not billed a service charge, the general facilities charge can be used to ensure that developing properties "buy into" the prior capital investment in the system. This type of financing works

best when the newly developing properties must obtain a permit to hook up to the drainage system, as in the case of water and sewer.

The general facilities charge is probably most appropriate when a simplified rate structure is used which lumps operating and capital expense into a uniform system of charges or an "equivalent residential unit" approach. In such cases, the cost of all elements of the drainage program are spread area-wide without a highly refined cost distribution formula.

The underlying philosophy of this approach is that the improvement serves everyone, or the system is viewed as a fairly uniform whole rather than as a number of discrete parts. There is usually no need to break down a general facilities charge into component parts, whereas a system development charge is often associated specifically with revenue bonds for individual improvements, which suggests that much closer accounting practices are justified. It is possible that several successive revenue bonds for a series of phased improvements could result in a property owner having to pay more than one SDC at the time of development, whereas a general facilities charge would simply lump the costs together. The system development charge may even be specifically provided for in the bond ordinance, which would probably prevent future city councils from rescinding the charge until all bonds are repaid. General facilities charges, on the other hand, are not usually associated with specific bonds.

Other terminology is used in different areas of the country for financing concepts quite similar to general facilities charges. The ubiquitous water and sanitary sewer "hook-up" fees are often intended to help finance general improvements to the systems rather than simply cover the expenses related directly to the hook-up itself. Some cities include general facility charges in building permit fees, or other municipal approvals associated with development. Regardless of what they are called, general facilities charges for drainage provide an additional revenue source which may fill in gaps in a utility rate structure. The gaps are often intentional and reflect the city's financing policies (e.g.. undeveloped properties do not help finance utility systems), or occur because of billing system limitations.

In-lieu of construction charges are becoming more common as local stormwater management agencies grow in technical sophistication and better understand the drainage control options available in their communities. These charges are particularly useful when more than one type of drainage system would solve or mitigate a problem, but one approach would be privately financed while the other would be paid for from public funds. In some cases the public agencies would prefer to have the type of system that would require public financing, yet do not want to forego the private investment which is justified. In-lieu of construction charges can offer the best of both options by allowing the most desirable system to be built while still ensuring private financial involvement.

For example, on-site stormwater detention/retention has been required on new developments in many cities and counties to mitigate potential increases in runoff. The intent has been that the individual on-site systems would transfer some portion of the drainage control costs to the private sector, moderating peak flows and reducing the required size and cost of public conveyance systems somewhat. However, uniform and easy to administer on-site detention requirements (which many communities opt for) may overlook the hydrologic and hydraulic phenomena of timing of flow through a drainage system. On-site detention at the bottom of a drainage basin could actually add to the peak flow rather than reduce it, by retarding the release from the site until the peak flow from the upper basin has reached the lower sections of the system.

In addition, on-site systems in residential subdivisions pose a long-term maintenance problem for municipalities. Homeowner's Associations and Community Clubs are rarely inclined or equipped to properly maintain detention systems. Since the on-site system affects the proper function of the public conveyance system, the local government more often then not must assume the maintenance responsibility for the detention facility. After only a few years, several cities and counties have found themselves saddled with hundreds of small residential detention systems scattered throughout a drainage basin which become an increasing maintenance headache and expense.

One control option is to install larger but fewer regional detention systems to reduce peak flows, but this involves additional public expense which the on-site systems were intended to alleviate. One viable solution is to offer

developers the alternative of paying an "in-lieu of construction" charge instead of building the on-site detention system. Such fees are then earmarked to pay for regional detention facilities.

This approach will probably be enthusiastically welcomed in communities where developers have experience with building their own on-site detention systems. Not only are the developers relieved of the cost of design and responsibility of building the on-site facility, but they gain more flexibility in the use of their property since an area need not be set aside for detention of stormwater.

The in-lieu of construction charges can be scaled in several ways to reflect the local experience with on-site detention costs and related policies. If the fee is earmarked to help pay for regional detention ponds to take the place of the on-site systems, it might be structured to provide the local agency with all or a certain percentage of the revenue to retire the bonds used for construction financing of the ponds. In effect, developers buy detention capacity in the regional facility from the municipality. This method requires that some assumptions be made about the rate of development and amount of participation in the regional facility by developers.

Another approach is to have the developer design and obtain bids for construction of the on-site system, with the option of either building it or paying the low bid amount to the municipality. This alternative works only if the city or county retains the right to refuse the in-lieu payment and require construction of the facility, since it prevents collusionary "lowballing" of the construction bid. In this case, however, the community may miss out on the opportunity to share in the full financial benefit the developer realizes by not having to build the facility, such as more productive use of the property or the addition of an extra building lot in a subdivision. Construction costs are only a minor portion of the developer's total cost for on-site detention.

The in-lieu of fee can also be based on the average construction costs for on-site detention systems in the local area. For example, a fee schedule might call for $3.50/cubic foot of required detention capacity up to 2500 cubic feet, $3.00/cubic foot between 2500 and 5000, and $2.00 cubic foot above 5000. This kind of fee schedule could enable

the city to bond for and build regional facilities, with some or all of the debt service on the bonds provided by these charges. A fee schedule could justifiably exceed the actual average construction costs of on-site detention systems somewhat since developers are relieved of design costs and gain greater use of the property, and the city assumes the maintenance cost for the regional facility.

In the event of bonding for the regional improvements, assumptions would have to be made about the pace of developments. Because of the uncertainty of development-related charges, the bond would have to be guaranteed in some way by the credit of the city or county, or by utility service charge revenues if a drainage utility were established.

Latecomer's fees are especially useful in developing areas or where major reconstruction or upgrading of a drainage system is needed, public funds are limited or not available, and a private development is contingent on the improvement. For example, an apartment developer wishes to construct a new complex in an area where the drainage system would have to be relocated and increased in capacity to accommodate the development. In addition, it is expected that other development upstream from the proposed apartment site will increase flow in the future, necessitating oversizing of the new conveyance system. The city does not have funds to improve the system, but through a "developer extension" agreement can allow the apartment developer to construct the improved and over-sized drainage facility in conjunction with the apartment project.

The incremental cost of oversizing to serve future development could be defined as a developer extension to be paid for through a latecomer's fee by those who develop in the upstream portion of the basin at a later time. The latecomer's fees are turned over to the developer as they are received. A small charge for processing the fee is often included to cover the jurisdictions administrative expenses,

Developer extensions are common for water and sewer systems in new developments, but have not been widely used for drainage systems. The latecomer's fee is usually only used for oversizing costs, for example in the case of

sanitary sewer interceptors or to ensure fire flow capacity to other properties. This precedent may apply to drainage systems as well.

Regardless of what these various fees and charges may be called, they typically have specified purposes, and are accounted for in a manner which allows the revenues to accumulate. Appropriated but unexpended money in non-dedicated general fund accounts is normally “lost” at the end of each fiscal year, i.e. it is returned to the general fund for redistribution in the next years budget. Fees and charges dedicated for specific purposes can be carried forward, and, reserves can accumulate if an enterprise utility fund is established for drainage which separates the revenues from the General Fund.

Revenue which is not spent for several years may also require special accounting treatment in municipalities in some states. Usually the money must be accounted for in the budget, even if it is not intended to be spent during that year. For water, sewer, and solid waste, a "utility expansion fund" is often the reserve account for these revenues in a municipal budget. Drainage utilities can use the same accounting technique to make dedicated reserves less susceptible to application to other needs, a protection which may be important in differentiating fees from taxes. Utilities are allowed to retain surplus funds, both as a reserve to respond to emergencies and as a natural function of long-term rate structures which are predicated on differing rates of change in expenditures and revenues over time. Thus a utility may generate a surplus during the first few years that a rate structure is in effect and operate at a fiscal-year deficit (in terms of annual revenues versus annual expenditures) in later years as the surplus is drawn down. This reduces the frequency at which the rate structure must be changed, contributing to stability. Similar accounting practices allow revenue accounts for fees and charges in a utility to accumulate. It is important to clearly identify reserved funds in the annual budget and to maintain a proper audit trail to ensure that an accurate picture is given of the enterprises balance sheet, including fee accounts.

Special Assessments.

Several methods of levying special assessments on benefited properties to pay for drainage improvements have been used around the country. In most cases, the projects have a demonstrable benefit to the properties included in the assessment area and the charges for each parcel are consistent with the relative benefit to each property. Special assessment options may include Local Improvement Districts, Utility Local Improvement Districts, Areas of Special Benefit, and special-purpose taxing districts.

Local Improvement Districts (LID's) have been used in many states to localize the construction costs of small projects which serve a limited area. Most states allow then to be formed either by petition from the property owners in the proposed assessment area or by the city council or county commission. LID's formed by a city council or county commission are usually subject to a remonstrance process by the affected property owners, though ratification by a vote is not required. Petitioned LID's often require the signature of property owners who would bear 50% or more of the total assessment.

Utility Local Improvement Districts differ from LID's primarily in terms of the provisions they employ to ensure long-term maintenance of the system. The ULID concept has been used extensively to fund extensions of water systems, where the ability to generate revenues to pay off the bonds is dependent on the continuing water service to the customers. Proper maintenance is essential to guarantee the bondholders that revenues would be generated. ULID's therefore include a monthly charge for maintenance as well as the lump sum assessment for the initial capital improvement. The maintenance fee is normally required for at least as long as the bonds are outstanding. The monthly maintenance fee may also include a coverage factor similar to that required in most revenue bonds, although in this case the extra revenue generated by the coverage is accumulated in an emergency reserve and provides a cushion against inflation in maintenance expense in later years. Most ULID's require that the maintenance charges be deposited in a special fund to be used only for that project.

Traditional uses of Local Improvement Districts (LID's) and Utility Local Improvement Districts (ULID's) have been for linear systems or improvements, such as street overlays, sidewalks, water systems, sanitary sewers, and street lighting. Conventional methods of distributing the capital improvement costs among the benefited properties reflect their historical use for these linear projects. Often, the properties in the LID or ULID area are billed for a share of the total cost that is based on their front footage along the improvement, the gross land area of each parcel, or a formula which incorporates a combination of front footage, gross area, and distance from the improvement. These approaches seem to work best when the proportional benefit of the project is approximately commensurate with the amount of frontage or total area on each property. Similar cost distribution methods would be suitable for some drainage improvements, such as replacement of a street-side swale with a pipe, but their application to regional detention ponds might not be as appropriate since the improvements are not linear systems and such ponds control drainage from upstream properties but also protect downstream ones.

Another common assessment method uses an equal-unit charge based on the number of properties in the assessment area. This might be most suitable for financing a local project that serves all properties in an assessment area equally and provides an equal opportunity of use.

Both LID's and ULID's differ from other special assessment methods in that they normally use a cost distribution formula that is not related to the value of the properties. Special taxing districts commonly are funded by an excess millage levy of ad valorum property tax, but the improvement district concept has been refined to the point that charges are based on a number of considerations other than property value of special benefits in the form of enhanced value. A concept based on availability of service has received widespread use, and is not value or special benefit oriented strictly in an economic sense.

Areas of Special Benefit have been authorized in several states for financing a variety of projects, usually those which are at a single location (rather than linear) but have a general benefit to a surrounding area. Most applications of this approach have been in states that specifically provide for them, or in Home Rule cities with substantial

authority. Examples include downtown public parking garages which benefit surrounding buildings and businesses and multiple-use retention/detention areas which provide recreational opportunities to an entire neighborhood.

In most cases, the cost distribution method for Areas of Special Benefit is based on a formula which weighs the various properties' benefits and charges them accordingly. The emphasis on benefit may make this method less suitable for drainage financing than others which allow consideration of contribution to the problem and level of service rendered. For example, it could exclude properties which cause or contribute to problems but do not directly benefit by their solution.

Drainage Districts, Diking Districts, and Irrigation Districts are all special-purpose subdivisions of local goverment with specific authority to deal with stormwater management. In most states they are supported by excess property tax levies on an ad valorum basis, though some are also authorized to charge fees for services, such as providing irrigation water. These special-purpose agencies lack many of the essential general-purpose responsibilities of cities and counties which allow comprehensive urban runoff management, such as land-use control and police powers. Experience has shown they are best suited to rural areas, usually in agricultural communities.

Special district concepts have been expanded in the past decade to offer a more appropriate mechanism for managing urban drainage problems. The Urban Drainage and Flood Control District in Denver, Colorado is a regional agency which combines the administrative focus of a special-purpose agency with the financial clout of a larger government. Covering six counties and more than twenty-five cities, the District is supported by an excess property tax levy. It is the lead agency for flood control planning in the Denver regional area, operates several large facilities, and provides partial funding for local drainage projects on a matching basis.

Existence of the Urban Drainage and Flood Control District and its matching funds for local projects may be partially responsible for the development of local stormwater management financing in many of the cities in the Denver area. Several drainage utilities have been established, and a notable use of the revenues in many jurisdictions

has been to match funds from the District in order to construct major capital improvements which otherwise would probably not have been built. The District has also been able to coordinate flood control planning in the region, a major benefit since most of the drainage basins cross jurisdictional lines.

Criteria for Evaluating Financing Options

Whenever an effort is made to develop a new drainage program and/or a new financing concept for a municipal function as complex as stormwater management, some basis must be established for judging the appropriateness of the various options. A financing strategy must provide a stable, adequate, and publicly acceptable source of funds which will support the entire program as efficiently and equitably as possible. Transition, growth, and future program requirements must be considered as well as immediate needs.

The Financing Strategy cannot be responsive only to the program needs, however. It must be consistent with the community's perceptions and resources. Based on experiences in cities and counties which have implemented innovative stormwater management financing and program
strategies, the following criteria were selected as qualitative measures of the financing options.

It Is unlikely that any single financing method will be judged best under this wide range of considerations, but the criteria should help identify the best mix of funding methods, and reconcile differences between program and financing strategies . Some of the criteria may be viewed as more important than others. The order does not imply a priority, although public acceptance based on perceived equity is essential for political success of any new stormwater financing proposal. No single criteria should overweigh the others to the extent that an option is selected or rejected solely on one consideration.

Perceived equity and public acceptance.

Public acceptance of a financing strategy and the mix of financing methods it incoroporates is absolutely essential for a drainage program to be successful. It must be recognized that some members of the community will not wish to

pay anything, through any financing method, to fund drainage control. In most cases, a larger segment of the population will understand the need for an adequate stormwater management program, and the necessity of paying for it. To these citizens the critical issue is usually equity. It is important to note that perfect equity is probably not achievable either technically or economically, and that public opinion will be based on "perceived equity" and an appearance of basic fairness in financing.

The key is to finance stormwater management in an understandable manner. This is the strength of the functional requirements analysis approach to developing a drainage program and financing strategy. It presents a logical association between what is done (functions) and how to pay for it (financing). To achieve perceived equity and public acceptance this logic must be communicated to the general public through various public information concepts.

The specific methods used to involve the public are a function of the community structure and the type of program and financing strategy. It is evident, however, that some key points regarding equity must be made in any public information program related to drainage financing.

First, the revenue sources for general funds are not based on stormwater management considerations. There is no intent to balance the contribution each person, business or property makes to the drainage problems with the amount they pay into the General Fund. This is not to say that the General Fund is inequitable, but rather that if it is an equitable source of financing for stormwater management it is so only by accident. A utility service charge is not inherently an equitable method either, but it can be made so through a rate structure relatively easily.

Equity is usually best served by associating the charge, in whatever form, as directly as possible with the activity or improvement to which it relates. The array of options identified for this paper includes several which allow costs to be billed to a local area or specific clientele for this purpose.

The pursuit of equity can quickly result in undesired side-effects if carried to extremes, however. For example, it might be most equitable to physically measure the actual amount of runoff from each property as the basis for a service charge to pay for capital improvements. Obviously, this would present both a technical and administrative nightmare. Basic fairness can be achieved by treating similar properties in a similar manner, and balancing the charges to classes of properties so that they reflect the average contribution to runoff for that type of land-use intensity.

Some costs may be relatively uniform across an entire city or county, and the work necessary to differentiate costs geographically might not be cost effective. Administrative costs are a good example. It would be nearly impossible to account for administrative time and expenses on the basis of much work is done in each sub-basin in a municipality, and bill the properties in each area commensurately. This would justify a uniform distribution of the administrative costs among properties in all basins in the jurisdiction.

Capital improvements, either in terms of new systems or remedial repair and replacement of aging or inadequate systems, will typically be distributed unequally in any given year within a city or county because of the limited amount of work relative to the size of the total drainage system. This encourages the use of localized funding.

It is likely, however, that all urban areas in a city or county will require capital improvements during the long-term, with timing in any specific basin being largely a matter of priorities. This suggests that a uniform distribution of capital improvement costs may, in the long-term, be equitable. It would also allow the greater financial capacity of the entire jurisdiction (versus any single basin) to be used to fund capital improvements, which is more likely to result in projects actually getting funded and built. Also, historical community-wide investment in drainage systems should be considered In determining future cost distributions if utility financing is implemented.

Flexibility.

A great deal of change is anticipated In stormwater management programs during the next decade. More effective regulation and maintenance of systems will probably be required in most cities and counties. Water quality may become as important a concern in the overall management of the drainage systems as flow control. A financing strategy should be responsive to the growth needs of the program, and to the physical complexities of the drainage basins. It must provide a flexible approach which can grow incrementally with the program.

To gain this flexibility a mix of financing methods is likely to be needed. Some methods may require authorizing legislative action at the state level, and the local government may have to substitute a second choice for funding some functions until such legislation is adopted. Care should be taken during the interim not to foreclose options which require legislative authorization. It is also possible that a financing strategy selected through this process will not fit the needs 10 or 20 years in the future, in which case the most flexible system might be the easiest to adjust to meet changing priorities.

Capacity.

The financing methods should be carefully evaluated to determine if they can generate sufficient revenue now and in the future to meet program needs. The public's "willingness to pay" may have thresholds beyond which they will not support even the most equitable financing system for stormwater management.

Perceived equity is a factor in the public's willingness to pay. Their willingness may increase with the strength of their perception of equity. However, emphasis on equity also carries with it a potential problem if the financing capacity of the most logical and equitable funding method is insufficient to accomplish the program. A local agency might be viewed as inconsistent if it promotes a financing strategy on the basis of equity, except when the equitable approach does not generate enough revenue.

Analysis of long-term financing capacity is important, and the equity criteria must be tempered with a degree of reasonableness. Inflation and other factors can render even the best estimates unreliable, which would suggest that the greatest emphasis be placed on short-term financing capacity (for no more than five to seven years).

Cost of Implementation.

The bottom line to many of the criteria identified in this paper is cost. A "perfectly equitable" financing method might be desirable and achievable except for the cost of development and maintenance. Absolute compatibility with other programs and policies may be unachievable in some cases, except at great cost. Flexibility may be limited in a financing strategy to avoid the expense of an excessively complicated mix of financing methods, or to limit the complexity of needed rate structures.

The initial cost of implementation must be weighed against the financing capacity of the options and the program needs. A financing method which costs more to implement may be worth the added expense if the alternatives cannot generate sufficient revenue to fund the program. Another consideration is the source of revenue against which the implementation costs would be charged. One element of a financing strategy could be to delay the implementation of some financing methods until a Drainage Utility is formally established, making the subsequent implementation costs a utility expense rather than a general fund expense. The work might initially have to be funded from an interfund loan from another fund, but could be repaid later from utility revenues.

Finally, the cost of implementation must be weighed against the price of delay. Many segments of a drainage system may be in need of remedial repair or even replacement to prevent costly and dangerous failures. At least two years lead time is usually needed to prepare plans, designs, and bid documents to correct major drainage problems. Timely implementation may prove less costly in the long-run than the method with the lowest initial cost of implementation. Also, each month that a utility service charge concept is not in place means that the revenue is foregone.

Compatiblity.

Whenever possible, the financing methods for stormwater management should be compatible with existing policies, practices, and systems. This simplifies implementation and acceptance among the staff in other departments, and minimizes costs. Special emphasis should probably be given to ensuring compatibility between policies pertaining to the water and sewer utilities and those of a drainage utility if one is established.

In some cases, financing methods may necessitate substantial changes in existing practices or systems. For example, use of Drainage Utility service charges might require that the utility billing system be altered to incorporate the additional billing. Hopefully, any problems would not be ones of compatibility so much as just added work load to accomplish the transition.

An effort should also be made to anticipate opportunities to improve existing systems during a changeover in the drainage program. Development of a master billing file for a utility service charge could provide the mechanism for assembling a parcel-based data system which would have spinoff benefits for land use planning, economic development, and other municipal programs. The incremental cost of generating additional data for management information systems is minimized if it can be "piggybacked" with the base file work being done for drainage or other related purposes. Municipalities should also consider compatibility with programs in neighboring jurisdictions and special-purpose agencies.

Upkeep Requirements.

The financing methods may have differing needs in terms of upkeep. Some require virtually no file or record maintenance, whereas others demand constant updates. Fee systems can be set up in a variety of ways which imply different upkeep procedures. Systems which minimize upkeep costs are desirable, but this must be weighed against both the equity and flexibility considerations.

This criteria is especially important with regard to Drainage Utility service charges. The upkeep requirements can be controlled through proper design of the data systems and processes that are used in the rate structure and for billing. The best reference for evaluating the upkeep costs of drainage utility service charge financing options during the finance strategy phase is the experience of other cities and counties which have implemented similar systems.

Balance.

A financing strategy must be balanced in terms of dependency placed on any single method of funding, the fit with the drainage program, and the resources of various sectors of the general public. A single source is likely to provide most of the money for annual operating expenses, i.e. either the General Fund or a utility service charge. An effort should be made, however, to balance the dominant revenue source with complementary funds for special elements of the program. A municipality can control (to some degree) the balance of revenue sources to ensure that the financing capacity is hedged against economic downturns and is responsive to economic improvements.

Drainage Utility rate structures are relatively inelastic, and more stable than other utility rates that are based on consumption (e.g. water and electricity). Most drainage rates are based on how the use of property affects hydrology and/or water quality, which does not change in response to the economy. Delinquencies tend to increase during recessions, however and a DrainageUtility is not totally immune from revenue shortfall.

With so much emphasis placed on reconciling the financing strategy with the program strategy, that aspect of balance is usually well-assured initially. Care must be taken that the balance of the financing strategy remains consistent with the various stages in the development of the program, especially in light of the capacity of various financing methods. If the cumulative willingness to pay of the citizens in a neighborhood is fully tapped during the first two years by application of a variety of fees and charges, another element of the financing strategy might later be rejected. Also, no segment of the community should feel that the entire drainage program is being carried solely on their backs.

Timing.

This consideration is most important in terms of time required for implementation, and whether it fits with the desired timing of the program development process. If possible, charges should be initiated during the rainy season, when peoples' recognition of drainage problems is highest. Some financing methods are highly dependent on timing for success. For example, Local Improvement Districts should be proposed when the problems are fresh in the residents' minds.

Geographical and Jurisdictional Considerations.

Unique geographical conditions should be incorporated into the evaluation, especially if there are numerous drainage basins in the city or county. Over the long-term, demand for drainage services may be similar, but some areas might require replacement of inadequate or failing systems years before others.

Possibly the most important jurisdictional consideration is the difference in service level and design standards between neighboring local governments which share responsibility for drainage basins. The financing options should be evaluated on their suitability for bridging technical differences to support mutually desirable solutions to problems. The priorities which each local jurisdiction places on achieving it's standards should also be reconciled with the opportunities afforded by financing options.

Stormwater Utility Rate Structures

The Stormwater Utility financing concept is fairly new, with most utilities having been established within the past ten years. Various utility service charge concepts have been tested by actual application, and in some instances by legal challenges. The precedents and experience of stormwater utilities in cities and counties in other states therefore provide a valuable reference.

Stormwater financing concepts tend to develop in response to local needs and resources, and in the context of a specific legal framework. A common thread, however, is that most communities' financing for stormwater management reflects the factors which cause the need for their program. Rapidly developing communities tend to use financing which ensures appropriate participation in the cost of new systems by developing properties. Those with systems that are essentially fully developed and require routine maintenance often opt for a single service charge concept which spreads the program cost more or less equally throughout the community. Those with major rehabilitation and replacement needs may select a combination of service charges which differentiate the costs of routine maintenance from remedial work, or separate the funding of major trunks from that for local collector systems.

Brief summaries are provided below of a range of stormwater utility rate structure concepts. No one of these will necessarily fit another community's needs ideally, but they do provide a guide to the basic philosophies underlying stormwater utility financing and demonstrate how different approaches can be adapted to fit local needs. As might be expected, the examples used are communities in western states where the stormwater utility concept is most widespread and has a track record approaching ten years. That experience has demonstrated both the financial justification of the stormwater utility concept and its political viability.

Examples of Stormwater Management Utility Rate Structures

Bellevue, Washington

Bellevue is a rapidly developing city east of Seattle. It has grown from 5400 people in 1953 to its present population of about 85,000. Previously an affluent bedroom community for downtown Seattle, the past five years have seen a major transition as several major corporations have located regional and even national headquarters in the Bellevue area. Initial planning for a comprehensive stormwater management program began in 1969, with a utility implemented in 1974.

Bellevue has had three rate structures, the first from. 1974 through 1976, the second from 1977 through early 1982, and the last in effect since then. Rate increases have been adopted to fund $10,000,000 in revenue bonding for major capital improvements to the systems. The present service charges generate nearly $4,000,000 annually. An average annual single family residential charge (8000-10000 square foot lot) is approximately $53.00.

The initial rate structure in Bellevue was based on the amount of impervious area on each parcel of property in the city. The impervious area on each parcel was measured using computerized mapping. Service charges were scaled on 500 square foot increments (O to 500, 500 to 1000, etc.). This system of charges did not bill undeveloped properties since they had no impervious area. Under this approach, the average single-family residence paid approximately $ 23.00/year.

The second rate structure concept in Bellevue, implemented in 1977, billed undeveloped as well as developed and public as well as private property. It was based on the gross area of each property and its effective "intensity of development". The intent of this type of rate structure is to bill each property in relation to its contribution to the drainage runoff flow by approximating the hydrological response on various types of land use.

Five categories were used for intensity of development classifications ranging from undeveloped to very heavily developed. Multiplication factors represented the various intensity classifications. These were multiplied times the number of square footage increments on each property (in 2000 square foot ranges) to determine a billing unit number. The billing unit number of each property was then multiplied times a base rate to determine the service charge. A city-wide rate change with this type of system requires only that the base rate figure in the calculation be adjusted. The gross area of each parcel in the city was determined for this system using computerized mapping techniques similar to those used to calculate the impervious area earlier.

The present rate structure uses the same basic concept as the second, considering gross area and intensity of development. The most recent adjustment to the rate structure is intended to balance the financial participation of undeveloped property better with the charges to developed properties, especially in light of a large rate increase required for debt service an revenue bonds. The Bellevue Drainage Utility bills the State Department of

Transportation for freeway rights-of-way in the city and the city for all street rights-of-way. School District and other public properties are also billed. Credits against the service charge are given to' properties which have constructed on-site stormwater detention systems to mitigate peak runoff during storms. Waterfront properties along Lakes Washington and Sammanish have reduced rates. Collection exceeds 95% of billings. An advisory ballot on the 1980 rate increase for revenue bonding showed a surprising 65% in favor of the 170% increase.

Tacoma, Washington

The City of Tacoma is an older community that is essentially completely developed, yet it uses a rate structure very similar to that in Bellevue. Tacoma developed rapidly between 1890 and 1925, and the population of about 165,000 has been fairly stable for several decades. The drainage system in much of the city is aging, and failures are increasingly common. One such occurrence (possibly compounded by adjacent construction activities) resulted in about $1,000,000 damage to a recently renovated stadium near the downtown area, and other problems abound in the drainage systems. Tacoma uses a rate structure based an gross area and intensity of development (like Bellevue), but the gross areas of individual properties are fit into 500 square foot rather than 2000 square foot ranges.

Tacoma has also established a flat-rate for residential lots up to 15,000 square feet, thus avoiding the need to measure each small lot for billing purposes. The residential lots that have more than 15,000 square feet are charged the flat rate plus an undeveloped intensity rate on the additional gross area of the property. This rate structure bills undeveloped and developed properties, and public as well as privately-owned parcels although city street rights-of-way are considered part of the drainage conveyance system itself and are not billed. The flat-rate charge for single-family residences in Tacoma is $34.08.

Tacoma presently bills five utility charges on one bill. Tacoma City Light, a separate enterprise utility, provides electrical and water service for the area, while the City of Tacoma provides sewer, sanitation, and drainage. The City presently contracts with City Light for billing. Within a few months, however, a separate billing system for sewer, sanitation, and drainage will be implemented in a cost-saving step.

Boulder, Colorado

Boulder is a city of approximately 100,000 located about 50 miles north of Denver. It is the site of the University of Colorado. Boulder was one of the first cities in the west to establish a drainage utility, and began billing in January, 1974. The revenue charges are used primarily for debt service of a revenue bond for capital improvements. They are supplemented by general fund money, the city's share of the state sales tax, and distributions from the Denver Urban Drainage and Flood Control Zone District, which provides matching funds for local projects.
The service charge in Boulder is calculated on the parcel size, a runoff coefficient, the location of the site within the drainage systems, and a factor if the property is located in the floodplain. The floodplain factor in Boulder is somewhat unique, and is intended to reflect the additional benefit that properties in floodplains realize due to the provision of an adequate drainage control system. The present floodplain factor is 1.5, which results in a 50% surcharge for properties in the floodplain.

A "standard" lot in Boulder is assumed to 7000 square feet with a runoff coefficient of .43. Larger properties pay on the basis of the number of standard lot sizes they have, and the relative ratio of impervious compared to a standard lot.

Clark County, Washington

Clark County, and its principal city Vancouver, Washington, are located across the Columbia River from Portland, Oregon. The county has grown rapidly in recent years as a suburb of Portland, with the population now approaching 150,000. The county and city established separate stormwater utilities, cooperatively developed a drainage control program in the late 1970's, and implemented a billing system in 1980 for one drainage basin, Burnt Bridge Creek. Consideration is now being given to expanding the utility service area to include the Salmon Creek basin to the north of Burnt Bridge Creek, which would give coverage to most of the urban area.

The Clark County Department of Public Works operates the drainage utility for the entire drainage basin, both inside the City of Vancouver and in unincorporated areas. It provides operations and maintenance and some minor capital improvements on a $500,000 budget. The rate structure uses a flat-rate single-family residential charge of $15.00 per year.

The County sends out the stormwater utility bills. An annual billing is used to minimize billing costs, with about one twelfth of the bills being sent out each month. During implementation, this enabled the utility to commence billing in early 1980 before the data work was completed for all accounts, resulting in initiation of the service charge approximately six months earlier than would otherwise have been possible. Collections are in excess of 90%, and have been almost since the beginning of the service charges.

The rate structure in Clark County is based on an "equivalent residential unit" (ERU) concept, in which billings to properties other than single-family residences are calculated by a formula which equates a property's runoff contribution to that of an average residential unit. The “average” residential property is estimated to be a 10,000 square foot lot with 2500 square feet of impervious surface (25%).

The impervious area of each property is estimated using the Tax Assessor's files and field measurement if necessary. The impervious area (to the nearest 100th of an acre) is then multiplied times a rate which relates the development intensity of the property to that or the "average" single-family residence. The rate structure differentiates multi-family structures from commercial properties. Using this rate structure results in billings only on developed properties, of course. Public rights-of-way, including city streets, county roads, and state highways are not billed if they provide onsite detention capacity to mitigate increases in peak flow runoff, or have agreed to install them. Other properties are given partial credit against their bills for such facilities.

Denver, Colorado

The City and County of Denver has established a stormwater charge which generates about $4,700,000 annually for maintenance and operations. Single family residences pay about $17.00 per year. The rate structure is based on a combination of the amount of impervious area on each property, the ratio of impervious area to total area, and a "rate" applied to each impervious "ratio group".

Ten "ratio groups" are used to represent the percentage of impervious coverage (O to .10, .11 to .20, etc.), with each group having a rate (such as $.37, $.47) that is multiplied times the total square footage of impervious area, and the product is then divided by 100 to determine the annual service charge. The rate for the various ratio groups is actually the controlling mechanism in this approach, much as the assigned multipliers for the intensity of development classifications determines the rates in Bellevue and Tacoma.

This approach is similar in some ways to the rate structure used in Bellevue, except that the intensity of development (represented by the ratio group) is multiplied times both the impervious area and a rate, rather then just times the gross area off the property (stated as a range increment) as in Bellevue.

Corvallis, Oregon

The City of Corvallis is a medium sized (pop. 40,000) college town in the Willamette Valley south of Portland, Oregon. The stormwater service charge concept in Corvallis is similar to that in Clark County, Washington, but uses an "equivalent service unit" (ESU) rather than an equivalent residential unit, and is based an impervious area rather than gross property area,

The ESU was determined by doing a random field sample of various types of land use. The City found that an average single-family residential lot in Corvallis had about 2750 square feet of impervious area, which is the amount used to define an ESU.

An ESU is presently charged $19.20 per year. The average multi-family property in Corvallis was determined by field checking to have approximately 4.8 ESU, while the average commercial/industrial properties had 12.5 ESU. The revenues are being used for both operations and maintenance and minor capital improvements. The City's experience in collecting the service charges, which are on the utility bill, has been excellent.

Table 3 Indicates the service charges for typical properties which result from the previous or present rate structures used in some of these jurisdictions. The amount of the service charges should not be compared between the various communities except as an indicator of the range of typical charges. The programs vary significantly, and differences in the amount of the charge often reflect these variations.

For example, Bellevue, Washington's present rate structure provides debt service for $10,000,000 of revenue bonds and a fairly comprehensive program, while the new program in Clark County, Washington provides maintenance and some minor capital improvements on a "pay as you go" basis. Also, the physical and hydrological conditions in Denver differ dramatically from the communities in the Pacific Northwest.

Perhaps the most meaningful comparison between the rate structures is revealed by the multipliers which are indicated in parenthesis in Table 3. The numbers indicate how much the examples of typical non-residential properties pay in relation to a typical residence. In Bellevue, for example, large, heavily developed properties have had their relative rates reduced in each of the three rate structures used since 1974. Heavily developed properties in Denver pay almost four times as high a relative rate (compared to single family residences) as do the properties in Bellevue, while those in Tacoma pay only about two thirds as much relative to the residential rate. There is a general consistency in the rate structures, however, with charges increasing as the intensity of development increases. It should be noted that contribution to water quality impacts have not specifically been factored into any of the rate structures, except that it may be cited as one of the general considerations in charging heavily developed properties a higher rate.

Table 3
Examples of Service Charges

	Typical Example Properties					
	A	B	C	D	E	F
Bellevue, Wa. (1974)	$ .00	1.65	22.00 (13)	110.00 (67)	137.50 (83)	910.25 (552)
Bellevue, Wa. (1977)	1.72 (2.2)	.78	7.80 (10)	34.32 (44)	29.25 (37)	271.81 (348)
Bellevue, Wa. (1982)	2.86 (.7)	4.41	38.15 (5)	165.66 (38)	244.82 (55)	1308.66 (297)
Denver, Co.	.00	1.43	32.33 (23)	195.00 (136)	160.42 (112)	1613.63 (1128)
Tacoma, Wa.	1.74 (.6)	2.84	16.00 (6)	70.40 (25)	104.52 (37)	558.24 (197)
Clark County, Wa.	.00	1.25	10.94 (9)	54.71 (44)	68.93 (55)	452.76 (362)
Portland, Or.	.00	1.36	36.24 (27)	181.20 (133)	226.56 (167)	1499.13 (1103)

Typical Example Properties

A= 1 acre of undeveloped property

B= A typical single family lot of 10,000 sq. ft., 30 % impervious

C= 50,000 sq. ft. commercial, 40,000 sq. ft. impervious

D= 5 acre multi-family, 91% impervious

E= 10 acre school, health care center, etc., 57% impervious

F= 40 acre shopping center, 95% impervious

Conclusions

Alternative methods of financing stormwater management which offer opportunities to develop a stable, adequate, and publicly acceptable funding base are available to local governments.

A key to successful implementation may be the development of a long-term financing strategy, identifying the relationship between functional needs and funding, and defining the mix and timing of financing methods most appropriate in the local circumstances.

A number of communities have successfully established "drainage utilities" analogous to water and sanitary sewer utilities, which generate revenues through service charges providing an earmarked source of funds for stormwater management.

Enhanced financing only addresses one-part of the problem, but can provide the funding necessary to consolidate stormwater functions and responsibilities to achieve more effective programs.

FOOTNOTES

1. Urban Stormwater Management; Special Report #49; American Public Works Association; 1981.
2. The author has consulted on, observed, and researched stormwater management programs from Washington State to Florida. While this statement represents an opinion only, others have reached similar conclusions, including several of those involved in the preparation of APWA Special Report #49 on Urban Stormwater Management.
3. Revenue Shortfall; American Public Works Association; 1981.
4. America in Ruins; Beyond the Public Works Porkbarrel; Choate, P; 1980.
5. Snohomish County, Washington; Tampa, Florida; Washington County, Oregon.
6. Washington State; See Revised Codes of Washington, Chapter 36.89.
7. Bellevue, Washington sold $10,000,000 in revenue bonds in 1980 and 1982 to pay for major capital improvements to the City's drainage system.
8. California and Florida have several court decisions related to impact fees. Washington State recently passed legislation restricting the use of impact fees by municipalities.