

Theoretical Reflections on the Calculation of Development Impact Fees*

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Abstract: This paper theoretically explores the calculation of development impact fees focusing on urban growth, new urban development, developer, urban planner, housing, real estate market, community planning, community financing, local government, land use planning, public facilities, and development cost. Many questions related to who bears the burden of paying impact fees beg for answers based on empirical analysis. Those questions involve the extent to which landowners bear the burden, the effect of different levels of impact fees on the socioeconomic mix of communities, the distribution of fiscal benefits within a region where urban communities assess different levels of impact fees, and the preparedness of urban communities to accommodate development displaced by impact fees. Broader questions also relate to how urban and regional form is affected by differential application of impact fees throughout an area and whether money gained from the impact fees makes regional growth more or less efficient. Who ultimately pays development impact fees? There has been little empirical evaluation of how the market responds to development impact fees, but there is considerable information to suggest that, on the whole, the occupants – residents and users – pay the majority of the development impact fees.

Key Words : development impact fees, urban growth, new urban development, public facilities, development cost

요약: 본 논문은 도시성장, 신 도시개발, 개발업자, 도시계획가, 주택, 부동산 시장, 커뮤니티 계획, 커뮤니티 자금 조달, 지방 정부, 토지 이용 계획, 공공시설, 개발 비용에 초점을 맞추어 개발부담금 산정에 대해 이론적으로 고찰하였다. 개발부담금을 누가 부담해야 하는지에 대한 많은 질문이 실증적 분석을 기반으로 한 답변을 요구한다. 이러한 질문에는 토지 소유자가 부담하는 정도, 다양한 수준의 개발부담금이 커뮤니티의 사회경제적 혼합에 미치는 영향, 지역 내 재정 혜택의 분배 등이 포함된다. 더 광범위한 질문은 개발부담금의 차별적 부과가 도시 및 지역 형태에 어떻게 영향을 미치는가 그리고 개발부담금이 지역 성장을 보다 효율적으로 또는 덜 효율적으로 만드는가에 관한 것이다. 누가 개발부담금을 궁극적으로 지불하는가? 시장이 개발부담금에 어떻게 반응하는지에 대한 실증적 평가는 매우 부족하지만, 전반적으로 거주자(주민과 사용자)가 개발부담금의 대부분을 지불하는 것으로 알려져 있다.

주요어: 도시개발부담금, 도시성장, 신 도시개발, 공공시설, 개발비용

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1. Introduction

The supply of urban revenues available to pay for urban growth is dwindling. Faced with that fact and the need to pay for urban growth nonetheless, urban communities have had to come up with new ways to do so, often by assessing development impact fees on new urban development. While the problem of paying for urban growth may be substantially the same among urban communities, and while impact fees may be an important way to pay for urban growth, the manner in which urban communities design, administer, and refine impact fee programs will be different. Thus, a program used in one urban community cannot be applied to the next.

Policy makers in general and planners in particular would rather not see developers pass development impact fees to purchasers or renters of housing or occupants of nonresidential buildings. Rather, they want developers to pass development impact fees backward to landowners or absorb them through reduced profits (Ihlanfeldt and Shaughnessy, 2004; Been, 2005; Gowder and Wenter, 2010). Developers claim that they will simply pass development impact fees forward if they cannot pass them backward (Jeong, 2006; Burge *et al.*, 2013). Landowners, however, might argue that they will not sell unless they get their price (Lawhon, 2015). So who pays development impact fees? The answer depends on many factors. Urban planners should be knowledgeable about those factors. Consumers – homebuyers, renters, or nonresidential tenants – will pay the major share of development impact fees over

time. Furthermore, the use of high impact fees in one part of a metropolitan area can cause a shift in development pressure, socioeconomic mix, and fiscal structure throughout that area.

Developers cannot pay impact fees in the form of lower profits since, in a competitive economy, profits are already at levels of return that justify the cost, bother, and risk of investment compared to alternative uses of investment capital. Developers will stop production and not resume until demand exceeds supply to a point where necessary profit levels are restored. And if developers believe the presence of development impact fees reflects an antagonistic development environment, they will reflect that increased risk by demanding a higher rate of return on investment (Mathur, 2007).

So, who bears the burden of development and housing linkage impact fees? Residents of jurisdictions that assess impact fees will pay the impact fees in the long term. Where development impact fees are assessed on housing, residents of new and existing housing ultimately pay them in the form of higher purchase prices and rents, or of lower housing quality. Where development and housing linkage impact fees are assessed on nonresidential development, especially offices, the impact fees will push tenants who are sensitive to rising rent levels out of the urban community and will dissuade prospective tenants from choosing that jurisdiction. The jurisdiction is then denied a certain amount of future economic development.

Who are the beneficiaries of development impact fees? In general, the owners of existing real estate benefit by receiving windfalls in two ways. First, rising entry and production costs

reduce supply until excess demand forces rents to rise. Owners of existing holdings therefore gain increased rents if their property is competitive with new, more expensive buildings that must pay the impact fees. They gain another windfall when the jurisdiction uses impact fees to upgrade urban community facilities, thereby making the urban community even more attractive (Nelson *et al.*, 2012).

Some urban communities will gain, but at the expense of others. Urban communities with real estate markets that are modestly insensitive to price and barriers to developer entry gain three windfalls. First, the property tax base rises as prices rise to pay the impact fee. Second, as prices rise, only more affluent occupants move into the urban community, thereby increasing taxable sales throughout that urban community. Third, as affluent occupants displace lower-income occupants, urban community expenditures for indigent services fall. But other urban communities will bear the burden of displaced development and increased fiscal stress (O'Connell, 2012).

Many questions related to who bears the burden of paying impact fees beg for answers based on empirical analysis. Those questions involve the extent to which landowners bear the burden, the effect of different levels of impact fees on the socioeconomic mix of communities, the distribution of fiscal benefits within a region where urban communities assess different levels of impact fees, and the preparedness of urban communities to accommodate development displaced by impact fees. Broader questions also relate to how urban and regional form is affected by

differential application of impact fees throughout an area and whether money gained from the impact fees makes regional growth more or less efficient.

This paper seeks to theoretically explore the calculation of development impact fees focusing on urban growth, new urban development, developer, urban planner, housing, real estate market, community planning, community financing, local government, land use planning, public facilities, and development cost. Reflections on the calculation of development impact fees are structured as follows. In section 2, this paper examines the determination of the proportionate share of costs associated with new urban development. This paper, in section 3, examines some examples of calculating impact fees. Finally, in section 4, some conclusions are drawn.

2. Determining the Proportionate Share of Costs Associated with New Urban Development

The primary factors involved in attributing improvement costs to new development are selection of facility standards and determination of the proportionate share of the cost of constructing those facilities. Communities must demonstrate that the need for additional facilities result from new development, not from existing deficiencies. To make that judgement, communities need to determine appropriate facility standards in the general planning process, and must formulate a capital improvement plan under

which they will schedule improvements to correct existing deficiencies, upgrade service levels, and anticipate improvements that new development will make necessary. They then can apportion facility costs between current and new development.

Sound community planning begins with projections of future population, dwelling units, employment, and business activity. The projections lead to determinations of future developable land and supporting facility needs. They also lead to development of standards to project the need for, and the size and quality, of community facilities. Local governments must set or use established planning standards to justify impact fees.

Can new development make up the existing shortage? Not directly. The plan and its capital improvements component must first show how the community will eliminate the current deficiency without assessments on new development, perhaps through taxes that only current development will pay. Such taxation, which would affect new development as well, would equalize the burden of paying for existing deficiencies. All current development would be assessed the same rates for the same purpose. Once the plan has established community facility standards and determined the existing deficiencies and future needs, the capital improvements plan can schedule necessary improvements.

Determining the proportionate share of costs requires understanding the complexities of community financing and usually involves determining the following (Nicholas and Nelson, 1988):

1. The cost of existing facilities;
2. The means by which existing facilities have been financed;

3. The extent to which new development has already contributed, through tax assessments, to the cost of providing existing excess capacity;
4. The extent to which new development will, in the future, contribute to the cost of constructing currently existing facilities used by everyone in the community or by people who do not occupy the new development (by paying taxes in the future to pay off bonds used to build those facilities in the past);
5. The extent to which new development should receive credit for providing common facilities that communities have provided in the past without charge to other developments in the service area;
6. Extraordinary costs incurred in serving new development;
7. The time-price differential inherent in fair comparisons of amounts paid at different times.

1) Determining the Cost of Existing Facilities

Most impact fee schedules do not take inflation into consideration, nor should they, because no one knows what the rate of inflation – or the actual cost of building facilities – will be over a planning period (York *et al.*, 2017). The cost per acre of improving parkland should be recalculated and updated every year and or two. Such updating should incorporate changes in other costs. The same logic can apply to the preparation of impact fee schedule for roads, schools, fire and police, water, sewer and drainage, and other facilities.

2) Determining How Existing Facilities Were Financed

A principal requirement of impact fee programs is to shelter existing residents from paying for new facilities required to serve new development. Conversely, new development should not have to pay for facilities being built to serve occupants of existing development. For now, we only need to determine how existing facilities were financed. For example, if property taxes have financed most existing facilities, then the land on which new development occurs has already paid for part of those parks. If payments for parks or other facilities came primarily from state sales and excise tax rebates, state and federal revenue sharing or block grants, and other user fees and charges, they probably cannot be attributed to vacant land prior to development (Wiener, 2017).

3) Determining How Much New Development Already Has Paid

Owners of undeveloped land do not pay user charges, sales and excise taxes, or fuel taxes on that land. However, they do pay property taxes. If property taxes have financed facilities, even in part, local governments should determine the value of those payments (Bluffstone *et al.*, 2008).

4) Determining How Much New Development Will Pay in the Future

Issuing bonds is a common method of financing facilities. If bonds are outstanding when new

development occurs, the development will help retire them, thus lowering debt service charges to all existing property by broadening the taxable base (Jeong and Feiock, 2006).

5) Determining Credits for Facilities Installed by New Development

In addition to impact fees, many local governments require developers to install both on-site and off-site facilities that the community at large or a specific service area may use. For example, occupants of current development near new development may use facilities – such as a traffic signal – that contributing development installs. The local government should grant credit against fees for any on-site facilities or other dedications that occupants of current development in the service area use. That credit would be the value of the facility not otherwise attributed to contributing development (Lee *et al.*, 2014). Types of facilities that some communities consider in off-setting impact fees that way include roads, rights-of-way, traffic signs and signals, and turn lanes. In practice, determining appropriate credits against impact fees is a complicated and controversial exercise.

6) Determining Extraordinary Costs

The most common way costs may change is through cost increases from inflation or other factors. Impact fee programs may accommodate inflation by providing for periodic review of fee schedules. When costs increase through other factors – for example, increasing the cost of

purchasing parkland because of rising property values, irrespective of inflation – they may be passed on to new development as an extraordinary cost. Passing on those costs requires careful documentation, perhaps through appraisals. One can attribute a second way costs may change to idiosyncrasies of individual developments. St. Lucie County, Florida, for example, assessed impact fees that are nine times higher for developments on a barrier island than those for developments on the main land. The differential occurs because of the greater cost of building roads and bridges to the island (Mathur, 2013).

7) Time-Price Differential

Perhaps the most difficult consideration is the time-value of money. Situations in which that is important occur when other payments, not related to impact fees, finance new facilities over time, and when developers have to pay impact fees the benefits of which will not appear until future improvements are made. In the first situation, local governments often must install facilities to accommodate future development and must establish some equitable way to calculate the impact fee. A second problem about the time-value of money involves determining the benefit to fee payers when fees are to be spent on improvements in the future. A substantial amount of time may elapse before communities can productively spend the fees. Since they accrue in small amounts, it may take some time for the fees to accumulate enough to be useful. How long contributing development waits to receive the benefit affects the present value of

the benefit it receives (Burge, 2014).

The major and critical issues in establishing impact fees are (Nicholas *et al.*, 1991):

- Establishing facility standards
- Identifying current deficiencies
- Apportioning costs to new development
- Determining appropriate credits
- Determining any extraordinary costs
- Incorporating time-price differentials
- Ascribing benefit to fee payers

Proportionality calculations begin with a determination of physical quantities of facilities that new development will require. The determination of physical quantities of needed capital facilities requires, in turn, a standard for each service of facility. During the land use planning and capital improvements programming progress, a set of facility service standards must be adopted. These standards are the first, and perhaps the most critical, element of establishing a defensible system of impact fees. Unless standards are adopted and applied in land use planning and facility programming, impact fees may fail juridical review. Facility standards will lead to determination of current and future facility needs (Burge and Ihlanfeldt, 2006a).

The need for capital facilities may be expressed mathematically (Nicholas *et al.*, 1991):

$$\text{Needed Improvements} = \text{Service Standard} \times \text{Demand Unit}$$

This formula introduces the demand unit. A demand unit is that which is associated with a

new development that will require improvements in public facilities. For a single-family home, the demand units could be the occupants for purposes of parks; school-age children for purposes of schools; vehicular trip ends per hour or day for purposes of roads; or gallons per day for purposes of potable water. All services can be expressed in terms of demand units and standards of service.

3. Examples of Calculating Impact Fees

Several impact fees will be set out as examples (Nelson *et al.*, 2017). The fees are for roads (Martin County, Florida); schools (Anne Arundel County, Maryland); public buildings, libraries, parks, and fire/emergency service (Palm Beach County, Florida). The fees discussed are collected for and will be spent on capital improvements incurred or to be incurred in the provision of the respective service. For example, the park impact fee collects funds to be spent on new or expanded park acreage and facilities. No consideration was given to operational costs in the establishment of these fees and no fees collected will be spent on operations.

The demand units for a single-family unit and the service-level standards employed in some of these fees are (Nelson *et al.*, 2017):

- Roads (Martin County, Florida): a trip rate of $10.0/2 = 5$ adjusted trip ends per day with an average length of 3.8 or 3.0 miles, depending on the road district (making demand units 19 or 15 miles per day) and a level of service that translates to 8,750 or

8,840 vehicles per lane-mile per day, again depending on the district. It should be obvious that Martin County based its road impact fee system on average daily traffic and on the need for additional road capacity in terms of lane-miles. This approach is most relevant to the situation of Martin County. The alternatives would be to base the demand units on peak-hour traffic and to base the need for improvements upon peak-hour intersection capacity. This alternative would be relevant to a downtown-type environment where the need is not so much for additional lanes as it is to make better use of existing lanes. Either approach is valid for purposes of establishing road needs, costs, and fees.

- Schools (Anne Arundel County, Maryland): 0.6977 public school pupils per unit (demanding unit is 0.6977 students) requiring 129 square feet of building area and 1,836 square feet of land area per student.
- Parks (Palm Beach County, Florida): for unincorporated Palm Beach County 2,526 persons per residential unit 1,400–1,999 square feet in size (demand units are 2,526 persons) at a standard of 6.07 acres (2,986 acres improved) per 1,000 residents; the standard is adjusted on a municipal basis.
- Fire/Rescue (Palm Beach County, Florida): Demand units are 0.21567 service calls per single-family unit; the standard is a five-minute response time resulting in a capacity to respond of 4,380 calls per station.

These standards were all subjected to public debate.

The manner in which cost information may be obtained or expressed is an important factor in establishing standards because the objective is to first determine the capital improvements cost per unit of development and then to determine a proportionate share of those costs. It follows that standards, costs, and shares of costs must be in consistent units.

Cost data are needed for an acre of park, a lane-mile of road, a student station, fire/rescue equipment and facilities per service call, and a square foot of library. If utility fees are being established, the cost per gallon of capacity becomes the relevant item. The best sources of these data are actual local records. Recall that one of the judicial standards is that impact fees should not exceed a proportionate share of the costs that the local government will incur in accommodating the new development. Thus, the task is to establish a reasonable basis to project just what costs the community will incur. The actual expenditure history of the community would appear to be a viable basis to project such cost.

In Palm Beach County, Florida, the park capital improvements were based on the development costs of a typically developed park in Palm Beach County. Acquisition costs were based on the actual costs of acquiring. Costs were grouped into those for land acquisition and those for park development. The costs were then expressed as a cost per acre acquired or improved, and then translated into cost per capita. These two components were then added to obtain total park cost per capita. In this way, costs were consistent with the expression of the standard (6.07 total acres per one thousand

residents). The Anne Arundel County school costs were based on a combination of the prototype facility costs and the cost of construction programs.

One commonly used method of establishing cost is replacement cost. This is done by inventorying the existing stock of capital facilities and attaching a reasonable replacement cost to each item. If this method is used, the cost shown should be replacement cost rather than depreciated value or the initial acquisition cost (Burge and Ihlanfeldt, 2006b).

The per unit cost for the fees demonstrated below, and the source of that cost data, are (Nelson *et al.*, 2017):

- Roads: An examination of the road capital improvement construction bids, together with construction cost estimating guides, indicated a Martin County cost of \$569,290 per lane-mile for the Eastern District and \$515,740 per lane-mile for the Western District. An examination of rights-of-way acquisition, together with cost estimate guides, resulted in a right-of-way acquisition cost of \$107,600 per lane-mile for the Eastern District and \$29,700 for the Western District. Price adjustment will be necessary because these are not current costs. The expression of these costs amply demonstrates why Martin County instituted two separate fee districts.
- Schools: The Anne Arundel County School Board uses a prototype school and this prototype was the basis for cost. Costs for this prototype school were available. Additionally, these costs were consistent with a bid. Land acquisition and site development costs were

estimated from the actual records of school construction projects over five years. Land acquisition and site improvements costs were calculated as a percentage of construction costs – price adjustment will be needed. The data used were \$83 per square foot for buildings plus 4–5 percent for architectural and engineering costs (depending on school type) and 8 percent for equipment. The total building cost per square foot was \$87.78. Land acquisition had been running \$10,000 per acre, and site improvements costs were 2.5 percent of construction. The grand total was \$98.84 per square foot or \$12,767 per student at 129 square feet per student.

- Parks: An examination of the Palm Beach County capital budget records showed per acre acquisition that varied substantially according to park type. Those costs ranged from \$40,000 per acre for regional parks to \$225,000 for beach park land. Improvement costs varied from \$17,445 to \$57,119 per acre and were calculated on the basis of typically improved districts, beaches, or regional park in Palm Beach County.
- Fire / Rescue: Capital costs were obtained from property management insurance records, which provided total capital investment by fire / rescue district. The capital cost per call across the three fire / rescue districts ranged from \$475.11 to \$544.93. The cost per demand unit is based on the expected calls for service per unit per year.

Multiplying the service provision standards, per demand unit, by the capital cost per unit of

service establishes the capital improvement cost per unit of development. This also may be expressed as a formula (Nicholas *et al.*, 1991):

$$\text{Total Cost} = \text{Needed Improvements} \times \text{Cost per Unit}$$

The calculations for a single-family unit are shown in the Table 1 (Nelson *et al.*, 2017). These calculations result in the capital improvements cost per unit of new development – in this case a single family unit. Reaching this result is a cumulative process beginning with facility standards, demand units, and costs.

The preceding impact fees were based on the cost of providing existing facilities. In the future, the costs will likely be higher. Some impact fee schedules build inflation factors into their formulas. These inflation assumptions, however, are bound to be erroneous for any given year and the longer the fee schedule remains unchanged the larger the error will become. Such impact fee formulas would run a high risk of failing judicial review. The better way of dealing with changes in cost is with annual or biannual review of the data and parameters which serve as the basis for the established fees. What is recommended is annual and biannual redetermination of the cost of providing new facilities financed by impact fees (Burge and Ihlanfeldt, 2009).

To this point, all discussion has been about new facilities. However, impact fees can be and are charged for existing facilities when those facilities have been provided in anticipation of the needs of new development. The issue is not

Table 1. Demonstration fee calculations for a single-family unit

Roads	
Demand Units	19.00 miles per day
Standard	8,750 vehicles per lane-mile
Needed Improvements	0.00217 lane-miles of roads
Construction Cost per Lane-Mile	\$569,290
Right-of-Way Cost per Lane-Mile	\$107,600
Total Cost per Single-Family Unit	\$1,468
Public Schools	
Demand Units	.6977 student per unit
Standard	129.168 square feet per student
Needed Improvements	90.115 square feet
Cost per Square Foot	\$98.84
Cost per Student	\$12,767
Total Cost per Single-Family Unit	\$8,907
District Parks	
Demand Units	2.526 persons per unit
Standard Total Acres	1.130 acres per 1,000
Standard Improved Acres	0.632 acre per 1,000
Needed Improvements	0.00285 acres of parks
Cost per Acre of Park	\$42,500
Cost per Acre Improvements	\$55,563
Per Capita Cost per Acre	\$48.03
Per Capita Cost per Improved Acre	\$35.12
Total Cost per Single-Family Unit	\$210.04
Fire / Rescue	
Demand Units	0.21567 calls per unit
Standard	5-minute response time
Cost per Call	\$475.11
Total Cost per Single-Family Unit	\$102.47
Sewer	
Demand Units	1 resident unit
Standard	148 gallon average daily flow; design capacity 4 times average daily flow
Cost per Gallon of Capacity	\$4.33
Total Cost per Single-Family Unit	\$2,563

Source: Nelson *et al.* (2017)

whether the facilities are needed to accommodate new development. One convention resulting from this situation has been to call impact fees for existing facilities ‘recoupment’. Regardless of what they are called, they are still impact fees subject to the various tests of reasonableness (Burge and Ihlanfeldt, 2013).

The standard to which an impact fee will be held is that the fee not exceed a proportionate share of the costs that local government will incur to accommodate new development. To this point, only total costs have been considered. It would be a mistake to equate total cost with proportionate share of capital costs. New development does pay for the required capital facilities. New development will pay on bond

issues. New development will pay motor fuel taxes. New development will pay user fees. Additionally, various grants and other government financial programs (e.g., state school construction grants) contribute toward meeting capital costs. Such payments should not be ignored. The problem is that these payments are usually not sufficient to cover the total cost. Therefore, it is necessary to take the next step – to determine what proportion of the total costs new development must bear (Nicholas *et al.*, 1991).

The following is an explanation of the proposed Anne Arundel County, Maryland, school impact fee (Nelson *et al.*, 2017).

The method of calculating school impact fee is

Table 2. Prototype facilities, Anne Arundel County, Maryland

Building Area	K-6 68,280	7-9 115,000	10-12 180,000
Site (Acres)	22	40	55
Student Stations	610	800	1,200
Cost per sq ft	\$83.00	\$83.00	\$83.00
Land Cost (Acre)	\$10,000	\$10,000	\$10,000
Construction Cost	\$5,667,240	\$9,545,000	\$14,940,000
A & E	5%	4%	4%
Equipment	8%	8%	8%
Total Construction	\$6,403,981	\$10,690,400	\$16,732,800
Plus;			
Land	\$220,000	\$400,000	\$550,000
Off-site Costs	\$160,383	\$270,124	\$422,802
Total	\$6,784,364	\$11,360,524	\$17,705,602
Construction Cost per Student:			
Total Construction	\$10,498	\$13,363	\$13,944
Site & Site-Related	\$623	\$837	\$810
Total	\$11,121	\$14,200	\$14,754

Source: Nelson *et al.* (2017)

similar to that for calculating roads in that the primary factor is the quantity of physical facilities required to accommodate new development. Table 2 sets out the quantity and base cost parameters. The school board makes use of prototype schools. These prototypes allow for easy calculation of needed school space and the cost of that space for new students.

Table 3 shows the total school costs and the state funding for those schools. On average, state grants cover 52.9 percent of new school construction costs. This means that the school board faces a deficit of 47.1 percent or an average of \$6,010 for each additional student station required. The objective of the school impact fee

is to charge this deficit amount to new residential development in proportion to its impact on the school system.

The formula for calculating the Anne Arundel school impact fees is (Nelson *et al.*, 2017):

$$\begin{aligned} \text{New Public School Enrollment per Unit} &= \\ &\text{Children per Unit} \times \text{Percent in Public Schools} \\ \text{Cost per Student Station} &= \\ &(\text{Square Feet of Building Area per Student} \times \\ &\text{Cost per Square Foot}) + (\text{Square Feet of} \\ &\text{Land Area per Student} \times \text{Cost per Square Foot}) \\ \text{Total Cost} &= \\ &\text{New Public School Enrollment per Unit} \times \\ &\text{Cost per Student Station} \end{aligned}$$

Table 3. School costs and funding sources, Anne Arundel County, Maryland

Project	Construction Cost	Off-Site Cost	Funding Source	
			State	Local
Arundel Senior	\$8,830	\$17	\$4,675	\$4,155
Percent of Total		0.2%	52.8%	47.0%
Coratran Junior	\$7,283	\$686	\$5,145	\$2,138
Percent of Total		8.6%	64.6%	26.8%
West Annapolis	\$1,775	\$0	\$1,151	\$624
Percent of Total		0.0%	64.8%	35.2%
Area III -				
Special Education	\$4,076	\$76	\$2,737	\$1,339
Percent of Total		1.8%	65.9%	32.2%
Edgewater Elementary	\$2,457	\$265	\$1,477	\$980
Percent of Total		9.7%	54.2%	36.0%
Southern Elementary	\$10,507	\$0	\$5,154	\$5,353
Percent of Total		0.0%	49.1%	50.9%
Severn Elementary	\$5,737	\$140	\$1,812	\$3,925
Percent of Total		2.4%	30.8%	66.8%
Total	\$40,664	\$1,186	\$22,150	\$18,514
Percent of Total		2.83%	52.93%	44.24%

Source: Nelson *et al.* (2017)

State Grant = 5 Year State Capital Allocations /
 Total 5 Year Public Educational Capital Costs
 Net Cost = Total Cost × (1 – State Grant*)
 Impact Fee = Net Cost × 0,50 (Locally Applied
 Fee Discount of 50%)

* Expressed as a percent

Table 4 takes the space needs and cost data from Table 2, incorporates the state funding from Table 3, and calculates gross, net, and impact costs in terms of the various types of residential development which occur in Anne Arundel County. The proposed fee in Table 4 was

Table 4. School capital needs, costs, and impact fees, Anne Arundel County, Maryland

Type of Development	1-Family	2-Family	3- & 4-Family	5-Family & more	Mobile Home
Public School Children per Unit:					
K-6	0.3534	0.3276	0.2252	0.1356	0.2030
7-9	0.1850	0.1730	0.1093	0.0850	0.1482
10-12	0.1593	0.1224	0.0822	0.0895	0.1951
Total	0.6977	0.6229	0.4167	0.3100	0.5463
Square Feet of Building Area per Student:					
K-6	112	112	112	112	112
7-9	144	144	144	144	144
10-12	150	150	150	150	150
Construction Cost per Student					
K-6	\$10,498	\$10,498	\$10,498	\$10,498	\$10,498
7-9	\$13,363	\$13,363	\$13,363	\$13,363	\$13,363
10-12	\$13,944	\$13,944	\$13,944	\$13,944	\$13,944
Site Cost per Student:					
K-6	\$623	\$623	\$623	\$623	\$623
7-9	\$837	\$837	\$837	\$837	\$837
10-12	\$810	\$810	\$810	\$810	\$810
Total Cost per Student:					
K-6	\$11,121	\$11,121	\$11,121	\$11,121	\$11,121
7-9	\$14,200	\$14,200	\$14,200	\$14,200	\$14,200
10-12	\$14,754	\$14,754	\$14,754	\$14,754	\$14,754
Cost per Dwelling Unit:					
K-6	\$3,390	\$2,710	\$2,645	\$2,259	\$2,721
7-9	\$2,294	\$1,830	\$1,786	\$1,525	\$1,837
10-12	\$2,320	\$1,854	\$1,810	\$1,546	\$1,861
Total	\$8,004	\$6,394	\$6,241	\$5,330	\$6,419
State Contribution	\$4,235	\$3,383	\$3,302	\$2,280	\$3,396
Local Cost	\$3,769	\$3,011	\$2,939	\$2,510	\$3,023
Impact Fee	\$3,204	\$2,559	\$2,498	\$2,134	\$2,570

Source: Nelson *et al.* (2017)

reduced by 15% from the net (or local) cost. The fee adopted by the county council rejected the 15% discount and used a 50% discount from the local cost to arrive at the fee.

4. Conclusion

In designing development impact fee programs to pay for new facilities, as the articles by Jones (2015) and Mathur (2016) attest, there must be a strong sense that contributing development directly benefits from the impact fees it pays, even though the community as a whole may also benefit. Jurisdictions may accomplish that goal by being sure that impact fees pay for specific facilities at specific locations or areas that the development would obviously use.

Impact fees must be grounded on some rational basis. The urban community must assure contributing development that it will not use impact fees primarily to raise the quality of life for existing residents. In most situations, several factors should affect the maximum impact fee that a governing body can charge. Such factors include the portion of the facility that existing residents will use most frequently, and the portion that nonresidents, such as tourists, will use. Impact fees must also be adjusted by the value of state and other nonlocal government funds available to help finance the facilities supported by impact fees. Impact fees should be adjusted to reflect the taxes and other nonimpact fee payments that the contributing development may make over time and that

would pay for the same facilities financed from impact fees.

Flexibility in assessment, expenditure, and fulfilling other urban community policies is also necessary. Assessment flexibility can mean varying the payment amount to match the impact fee more precisely with the actual impact or it can mean changing the timing of the impact fee. Timing of payment is also important. Impact fee payment, whether at the development approval stage, building permit stage, occupancy permit stage, or on a phased development basis should assure local government of maximum revenues, but not at the risk of pricing development out of the market solely because of payment timing.

Flexibility of expenditure is also important. Funds for various types of projects, such as roads, however, are comingled so that small amounts of impact fees can be pooled to pay for roads needed earlier than other roads. Governments also must use flexibility in assessment to avoid contradicting other urban community policies. If an urban community wishes to encourage low-cost housing, it may reduce or waive impact fees for those projects. If the urban community wishes to broaden its economic base by not discouraging industrial development, it may assess lower impact fees or reduce the impact fee in proportion to jobs added to the local economic base.

Experience dictates that planners and other public officials must seize opportunities to assess impact fees. Impact fees are but one tool available to local government to pay for urban growth. Most impact fees do not come close to paying for all the true costs of serving new urban development. Communities must continue to

support many kinds of capital expansion through communitywide bond issues, maximum use of state sources, and perhaps more liberal use of special assessment/benefit districts or user fees (Burge *et al.*, 2007).

Who ultimately pays development impact and linkage fees? There has been little empirical evaluation of how the market responds to development impact fees, but there is considerable information to suggest that, on the whole, the occupants – residents and users – pay the majority of the development impact fees. Landowners may pay a portion, but developers are unlikely to pay any of the development impact fees in the long term.

Developers can pass impact fees along to landowners only if the market for buildable land is highly competitive and if supply can be expanded just as quickly as demand warrants. That is not possible, because expanding the supply of buildable land requires installation of the very infrastructure for which development impact fees are supposed to pay. The lag between receipt of the impact fee and its expenditure can be several years. Urban communities can expand the supply of buildable land by paying for infrastructure in advance, using general obligation bonds and other long term financing. Impact fees could then be used as ‘buy-in’ charges to reduce indebtedness urban communities incur in anticipation of development (Mathur *et al.*, 2009). The reality, however, is simply that urban communities probably will not expand supply unless development pays the impact fees first. Thus, there will nearly always be a lag as supply will always be catching up to demand. Landowners know this and expect to receive land

prices that do not fully account for impact fees. About the only way landowners can be charged the cost of the impact fees in the market is if every jurisdiction in the nation assessed the same impact fees everywhere. That is not likely.

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