Not an Economic Drag:
New Evidence of the Role of Impact Fees on Sustaining Job Growth

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EXECUTIVE SUMMARY

Local governments are increasingly seeking other ways to help for public facilities and infrastructure without the acrimony of increasing local property taxes. Impact fees, which are one-time charges against new development to help pay for facilities needed to serve it, are one such financing tool.

However, conventional wisdom among some public officials is that these development impact fees are bad for local economic development. As such, the effect of impact fees on economic development is controversial. Some say that fees act as a "tax" on capital, stifling investment and job growth away from communities that charge them to those that do not or charge less. Others argue that economic growth can depend on the timely provision of new infrastructure and expansion of buildable land because impact fees are a form of investment in the community.

Given that impact fees have become a popular source of funds for public infrastructure projects, it is important to understand the relationship between impact fees and local economic development, defined here as local job growth.

This report addresses the controversy around impact fees by reviewing the literature concerning the effect of impact fees on employment and the economy generally. It then analyzes impact fee data, assembled for the period 1993 to 1999, for all the 67 counties in Florida. This unique dataset was used to analyze the relationship between impact fee collections and new jobs. To that end, the paper find that:

- **Impact fees are not a drag on local economies.** Conservatively, the findings of the analysis prove that there are no adverse economic impacts on local economies from impact fees. However, a liberal interpretation would argue that the imposition of impact fees typically results in substantial positive effects on local employment, at least in Florida during the 1990's.

- **Impact fees can be used to pay for a variety of local needs.** In Florida during the 1990's, nearly two-thirds of the impact fee revenue was spent on the physical infrastructure environment - particularly transportation. Revenue was spent for other
needs as well, such as recreation and public safety, but most of the impact fee revenue was spent in such a way as to directly stimulate local economy.

- **Impact fees are generally justified as they can stimulate economic growth and also serve to alleviate the burden on property taxes in paying for new infrastructure.** Numerous studies show that property taxes usually do not cover the full cost of new infrastructure needed to serve new development. As such, impact fees represent an investment in communities, rather than shifting economic development to communities that do not charge them.

- **However, impact fees are not a panacea.** Economic development and job growth depend on myriad of factors - not just the imposition of impact fees. However, given the right fiscal environment, impact fees can directly fund vital infrastructure improvements and indirectly promote local employment at the same time. Considering tax limitations and growing demand for investment, communities in growing regions that have impact fees may become more prosperous in the long run than communities in those regions that do not have them.
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Impact Fees: the Grease That Sustains Local Economic Development

I. Introduction

Local governments throughout the U.S., whether they are growing rapidly or not, are generally left to their own devices to pay for essential services and infrastructure. Rapidly growing localities are frequently faced with demands for new infrastructure (i.e., roads, sidewalks and sewers), park and recreation facilities, schools, and public safety. Older, established places are often faced with costs of rehabilitating, maintaining or improving existing infrastructure, necessary to attract vital economic development. In either case, localities must rely on local taxes and some combination of property, sales and/or income tax to finance these additional costs and are increasingly looking for funding assistance.

During the 1970's price inflation pushed property values upwards which, in turn, escalated property taxes and created substantial taxpayer resentment (Altshuler and Gomez-Ibanez 1993). In such an environment, localities are loath to then raise taxes to pay for additional expenses associated with new development. Today this resentment is still prevalent.

In response to this antipathy, many municipalities are seeking to shift the burden of paying for public improvements - such as parks, schools, or streets - to developers. These charges, known as "impact fees" are one-time charges assessed by local governments against new development or the owners of new development to help pay for existing, new, or expanded infrastructure needed to serve that development. Thus, impact fees have been used to bridge the gap between the funds necessary to build new municipal infrastructure and the local funds on hand to do so. In turn, they provide politicians some cover for financing the necessary costs of new development.

Impact fees are by no means without controversy, however. They are seen by many as a damper on local economic development and by others as a feasible means to finance new public infrastructure growth. Developers often complain vociferously that impact fees detract from economic growth by driving up their costs, causing housing consumers to "vote with their feet" as a reaction to higher prices, abandoning jurisdictions with impact fees. Others say that impact fees are the only feasible means of financing new infrastructure development in a political environment hostile to traditional means of finance such as the property tax.

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1 All state governments distribute some resources to localities to help finance local public services. The extent to which this occurs varies from state to state and across services. But for the most part, local governments are "on their own".

2 This theory was originally advanced by Charles Tiebout (1956).
The question remains: are impact fees a form of tax, often considered to be a drag on growth, or a practical and efficient means of financing the vitally needed infrastructure that encourages new development and economic growth? Which view is correct? Unfortunately, there is little useful research on the question. Much of the "research" is anecdotal, often reflecting the view that impact fees are detrimental to economic development while other studies are flawed by a lack of appropriate controls or availability of suitable data. The purpose of this paper, therefore, is to examine whether impact fees foster or discourage local economic development.

The next section provides an overview of impact fees and its general role in economic development, as drawn from the best academic literature. Given the lack of academic research on the role of impact fees on job growth as a measure of economic development, Section Three reveals new analysis of this relationship, based on data in 67 counties in Florida. In short, it finds that there is no discernible adverse effects of impact fees on job growth. A conclusion and appendices follow at the end.

II. Impact Fees and Economic Development

Historically, development fees first appeared as in-kind exactions, land dedications or build/install requirements for the construction of specific facilities. Impact fees, paid as monetary instead of in-kind contributions, came into wide use in the 1970's, providing a more efficient and flexible means of local infrastructure financing. The cities and counties of some states, such as California, Colorado, Florida and Texas, have widely adopted impact fees as a means of financing not only on-site but off-site infrastructure development as well.

State Impact Fee Enabling Acts

[Chris- is this ok to include here? Table is from your book with some APA additions? But it looks like we're missing something between 1994 and 2001. ]

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3 The term "impact fees" and the more inclusive category of "development fees" can be confusing. There is a lack of uniformity in the nomenclature regarding these terms known variously as impact fees, infrastructure charges, special assessments, connection fees, building occupancy taxes, system development charges, fair share assessments, and capital reservation fees, depending on the way in which the fees are calculated and collected and even the region of the country (Snyder and Stegman 1986). This report subsumes all these variations under the category of "impact fees".

4 Florida's Growth management Act of 1985 does not specifically allow impact fees, but requires local governments to maintain adequate facilities and prohibits them to approve developments that cause a reduction in services for existing users. This "concurrency" law accomplishes essentially the same purpose as impact fees. See Carrión (2001).
Several factors are responsible for this increased focus. First, since the early 1980s the federal government has devolved certain powers and curtailed subsidies to state and local governments for the construction of public infrastructure. Second, state and federal mandates on such infrastructure as erosion control, wastewater treatment, highway construction, and stormwater drainage – just to mention a few – have raised the price of public infrastructure to local governments. Third, in the 1970s and 1980s, there rose popular resentment of new taxes and especially of rising property taxes. That sentiment was sustained through the 1990s even during times of relative prosperity as witnessed by Virginia’s rollback of the automobile tax (a form of property tax), Georgia’s expansion of homestead exemptions to the property tax, and Oregon’s caps on local property tax rates.

Today, the quantity and quality of new infrastructure development has lagged under these political and financial constraints resulting in deteriorating infrastructure quality, congestion of existing facilities, and inadequate infrastructure to accommodate new development. The choices local governments have faced are bleak - continued popular resentment from higher property taxes or economic stagnation and a reduction in the quality of life. Given this realization, localities and developers have gradually warmed to the idea of impact fees as a practical means of addressing fiscal shortfalls.

As this report concerns the relationship between impact fees and economic development, it is also necessary to define what we mean by “economic development”. The existing literature offers many ways to view the concept. It can mean improving incomes, reducing unemployment, broadening opportunities, developing skills, creating new markets, revitalizing stagnating areas, and so forth (Blakely 2000). The conventional view of economic development, however, is simply job

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formation (Blair and Reese 1999) for the simple reasons that nearly all forms of economic development are subsumed under this simple metric. Our purpose in this report is to observe the relationship between impact fee collections over time and new job formation, controlling for a variety of factors, explained below.

Here, we summarize the economic characteristics of impact fees first as a either a form of tax on capital or investment in production, and then as a means of making local economies more efficient, thereby creating more wealth locally.

A. Impact Fees as a Tax or Investment

The effect of impact fees on economic development is controversial. Some argue that the fees invariably act as a tax on capital, stifling investment and job growth. Others contend that growth can depend on the timely development of new infrastructure that impact fees can make possible.

It is important to note that impact fees are fundamentally different from taxes as they have been legally defended as a derivative of the police power to protect the health, safety and welfare of the community. Operationally, the important difference between impact fees and general property taxes is incidence and “who pays”. Impact fees are paid by the developer of a certain property and perhaps land-holders and the consumers of new infrastructure. General property taxes, on the other hand, are paid by the existing general population (Delaney and Smith, 1989). More important than their incidence, however, is the economic effects of impact fees in evaluating their role in efficiently developing new infrastructure.

If impact fees act as a deadweight tax in a competitive market then the supply of buildable land will decline by an amount sufficient to offset it - thus delaying the timing of new development (Downing and McCaleb, 1987). Likewise, if impact fees act as a tax on capital without creating value in the development process then markets will adjust by shifting the location of development and/or by raising prices thus cutting consumption and eroding economic efficiency.

If, on the other hand, impact fees work on the supply side as a prospective investment to expand the amount of developable land then the pace and quality of economic development could feasibly depend on imposition of the fees. Without impact fees the supply of buildable land could fall and the price of development rise. So the question of whether impact fees act as a tax, generally considered to be a drag on growth, or a practical means of investment in the vitally needed infrastructure that encourages new development and economic growth is an important one.

B. Impact Fees As Efficient Prices
When impact fees are equivalent to market prices they are efficient. Impact fees must proportionately benefit feepayers or risk being viewed as a general property tax. There is considerable legal precedent to suggest that impact fees must deliver benefits to feepayers comparable to the benefits received\(^5\). The legal principal involved is called *rational nexus*. There must be a relationship or *nexus* between the fee that is imposed and the benefit received by the development paying it (Snyder and Stegman 1986). The calculation of the benefit must be *rational* and not arbitrary; hence the use of statistics and formulas to calculate the nature of the benefit. Finally, there must be a need for impact fees to offset impacts of new development on infrastructure. Impact fees thus satisfy a two-pronged test: (1) new development creates a need for new or expanded facilities and (2) impact fees assessed and collected on such new development pay for adding or expanding facilities to meet the needs of new development (Nicholas, Nelson and Juergensmeyer 1991).

The obvious direct benefits derived from infrastructure investment include new roads and other transportation improvements, new water and sewer provision and so on. Indirect benefits include improved predictability for the private market in knowing when and where infrastructure investment will occur and more equitable treatment for developers due to the improved transparency of the process (Nelson, Frank, Lillydahl, and Nicholas 1992). The direct benefits of new infrastructure and the indirect effects from improved market efficiency mean that impact fees can potentially create more value than the actual amount of fees paid (Nelson, Frank, and Nicholas 1991).

The scope of infrastructure improvements funded by impact fees has grown over time, further contributing to improved efficiency. According to Snyder and Stegman (1986), the cost of roads, schools, storm drainage, water, police, waste disposal, and even libraries have been funded from impact fees. The public activities that have been funded by impact fees in Florida reflect this diversity: transportation, public safety, human services, economic development, and culture/recreation. Many of these public services have traditionally been funded from general property tax revenues reflecting the perception of impact fees as a development tax.

### III. A Review of the Impact Fee Literature

The focus of this report is the employment consequences of impact fee expenditures. The general literature on impact fees is substantial ranging from historic, legal and administrative, to economic factors. However, the literature is sparse on the relationship between impact fees and employment impacts -- in fact virtually nonexistent. A literature review solely focused narrowly on the employment effects of impact fees would be very brief and uninformative. This brief literature review,\(^5\)

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\(^5\) See reference list at the end for a list of cases cited.
therefore, is relatively comprehensive touching on many aspects of impact fees not directly related to employment and economic growth but which are essential to understanding the environment for impact fees.

Four questions are examined: what is the justification for impact fees; are impact fees economically efficient; who pays the impact fee; and what is the role of impact fees on infrastructure and land supply? Each area provides important context for understanding the effects of impact fees on employment and the economy generally.

A. What is the Justification for Impact Fees?

Local jurisdictions have at their disposal many potential sources of revenue that can fund new infrastructure. They come in three basic forms: 1) public; 2) private; and 3) shared. Public funding involves the use of general taxes, typically property taxes, to build and maintain nonutility infrastructure such as roads, parks, public safety, schools, and the like. The burden falls on all property taxpayers. Private funding involves the use of fees to finance infrastructure. This is common among utilities such as water, sewer, and drainage systems. The burden falls on all ratepayers. Private funding include all forms of exactions on new development, such as impact fees (Alterman 1988). Cost sharing occurs when private funds are leveraged against public funds. For example, impact fees paid by new development may purchase road right-of-way land but state funds (generated mainly from gasoline taxes) may be used to build the road once the land is acquired. Under this arrangement, new development may actually receive more value than the impact fees paid.

As mentioned, public facilities have historically been financed from property taxes. However, numerous studies show that property taxes usually do not cover the full cost of new infrastructure needed to serve new development (Burchell et al 2000). Conceivably, property tax revenues from existing households could cover the cost of maintaining and rebuilding existing infrastructure and revenues from new and more expensive properties could pay for the new infrastructure. However, it is unlikely that a uniform tax rate coupled with varying property values would produce the desired effect of exactly covering total infrastructure costs. New property values would have to be quite high in order to cover the full cost of new infrastructure development without increasing property tax rates for all in the jurisdiction. Finally, raising property taxes to finance new facilities benefiting new development are often politically infeasible (Nicholas, Nelson and Juergensmeyer 1991).

Consider the case of Alpharetta, Georgia, in the 1990s, based on the experience of one of the authors (Nelson). Local studies showed that to sustain provision of infrastructure to meet the needs of new development, the city would need to raise $90 million more than it projected in total revenues from all sources including state and federal transfers, and property taxes. It faced
numerous choices. It could raise property taxes on all development. Or, it could let the quality of infrastructure erode and in some cases become congested. Or, it could divert funds from maintenance to new infrastructure—only to postpone maintenance. Or, it could charge impact fees and keep property taxes at their current levels, expand infrastructure to meet projected needs, and continue maintaining existing infrastructure properly. It chose the latter. At the time, Alpharetta was the state’s fastest growing city. A decade later it still is.

B. Are Impact Fees Economically Efficient?

Again, when impact fees are equivalent to market prices they are considered to be efficient (Altshuler and Gomez-Ibanez 1993). Efficient development requires that the cost of infrastructure be included in the price of the development (Snyder and Stegman 1986). A key advantage of impact fees (and user charges generally) is the possibility of improving economic efficiency in the provision of infrastructure. Resources are allocated efficiently when prices are equal to the marginal cost of a good—the price to produce one more of something (Downing and Frank 1983). Under perfect competition, marginal cost pricing follows automatically. Taxes and fees are considered to be inefficient because they add to the market-determined price creating inefficiencies due to over- or underpricing. Thus, the question of whether impact fees act as a tax impairing economic efficiency or as an accurate and fair price paid for goods and services received by feepayers is central to the efficacy of impact fees as a source of funding new infrastructure.

What happens if user charges such as impact fees were efficiently priced? Brueckner (1997) modeled the growth paths of cities to assess the efficiency of different schemes of financing new infrastructure including cost-sharing arrangements and impact fees. The metric he maximized was the aggregate value of land in the city. Brueckner found that aggregate land value was greatest under an impact fee scheme. He noted that this result is consistent with the general economics literature which states that user charges should be set to equal the marginal congestion cost imposed by a user to achieve maximum efficiency. In practice impact fees are often underpriced because they are often set by average prices rather than the marginal price of serving a new development— which is usually higher. Nonetheless, Brueckner shows the aggregate benefits of the kind of pricing efficiencies impact fees may generate.

C. Who Pays the Impact Fee?

The incidence of an impact fee refers to who pays the fee. This could be the seller of raw land to the developer, the developer of finished lots, the builder of homes on those lots, the buyers of the homes, or the economy as a whole. Under a general property tax the incidence falls on all
taxpayers. Impact fees instead target the development process. In an obvious sense, it is the developer that pays the impact fee, at least in the short-run.

In the long-run, however, the developer strives to shift the cost of the impact fee. This occurs as forward-shifting to higher purchase prices or rents paid by the consumers of development, or as backward-shifting to the original owner as a lower price for undeveloped land. (Watkins 1999, Yinger 1998, Fischel 1987) When the demand for developed land is inelastic (relatively unchanged) and the supply of raw land elastic (highly responsive to market change) forward-shifting is likely to occur. When the demand for land is elastic and the supply of raw land is inelastic, backward-shifting is likely to occur. Despite general agreement in the literature on this pattern of incidence, Watkins (1999) observes how the shifting of development charges occurs is not well understood. He surmises that the impact fee burden will always be split between all the players in the development process.

Impact fees on commercial and industrial development add a complexity to the incidence analysis. Impact fees imposed on commercial development can potentially be passed on to customers and employees. If the products of an enterprise are price inelastic, then customers will bear a higher portion of the fee. Similarly, if local labor demand is weak and workers are immobile, then employees will bear some of the burden of the fee (Altshuler and Gomez-Ibanez 1993). This is one argument supporting the view that impact fees may be bad for economic development.

However, in a 1998 paper, Yinger rigorously formalized much of the earlier work on the incidence of impact fees. Yinger’s key result was that development fees led to a drop in the cost of land which was absorbed by landowners even when the development’s benefits outweighed the costs. The mobility of housing consumers implied they would bear no burden in excess of the infrastructure benefits they received. The mobility of developer’s ensured they would bear no burden if housing markets are competitive. Yinger’s results also confirmed that impact fees not only protect existing residents from the cost of new infrastructure but effectively gave them a property tax cut because of expansion of the property tax base. Yinger found that “Even with mobile households, competitive housing markets, and infrastructure investments that meet a benefit-cost test, one-quarter or more of the burden of these fees could fall on the owners on undeveloped land.”

D. What is the Role of Impact Fees on Infrastructure and Land Supply?

What is often overlooked in debates about impact fees is what they are actually intended to accomplish. The fundamental purpose of impact fees is to generate revenue to build infrastructure serving new development (Nelson 1988). As noted above, in the absence of impact fees, local governments may not have the revenue necessary to accommodate growth, in terms of paying for new and costly infrastructure. In such cases, growth either is stymied through lengthy planning
processes that are preoccupied with the efficacy of development when facilities are congested (such as roads and schools), stopped through moratoria, or displaced to other communities.

There is another purpose to impact fees that has been overlooked too long in the literature: its relation to land supply. Communities may have adequate facility capacity, such as in water and sewer treatment, but the distribution network may be insufficient to accommodate new development. From an economic development perspective, the availability of key infrastructure such as water, sewer, drainage, and roads to buildable land is perhaps the important ingredient to increasing the supply of buildable land (see, e.g. Blair and Premus 1987).

Finally, impact fees can reduce risk and uncertainty. In their longitudinal studies of Sarasota, Florida and Loveland, Colorado, Nelson, Lillydahl, Frank and Nicholas (1992 and 1991) found that impact fees reduce the uncertainty and risk of development and often are used to leverage the use of other non-impact fee funds to expand infrastructure. The effect is to provide developers with a reasonably predictable supply of buildable land in reasonably predictable periods of time.

There is thus a direct relationship between impact fees and the availability of buildable land that has been simply ignored in most of the literature⁶.

IV. New Analysis of the Role of Impact Fees on Job Growth and Economic Development

We come back to the central question: Do impact fees foster or discourage local economic development and job growth? In this section we present first the theory, then the setting for analysis, followed by the data, the methodological approach and general model. The next section reviews results. The methodological and statistical details are reported in the appendix.

A. The Theory

If impact fees function as an inefficient tax, communities with impact fees will tend to not perform as well as communities that do not use impact fees. However, if impact fees contribute to capital formation—an investment in local growth—then communities assessing fees should perform better than communities without fees, all things considered ("ceteris paribus"). Before proceeding, let us review how impact fees can be viewed as a contribution to capital formation.

First, the impact fee itself is a payment for which infrastructure is returned. Under rational nexus criteria, the fee cannot exceed the cost of infrastructure apportioned to the development net of other revenues. For example, if federal or state funds are available to help finance infrastructure,

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⁶ With the notable exception of Kaiser and Burby, 1988.
the impact fee is based on the cost of infrastructure less those external revenue sources. In this way, the impact fee can actually leverage more infrastructure investments than the development itself pays for through the fee.

Second, the impact fee must be spent on infrastructure in ways that benefit new development (albeit not necessarily on-site) and are roughly concurrent with its anticipated impacts, if not before. Road improvements, water and sewer expansions, and the like are typical facilities for which impact fees are spent.

Third, impact fees must be expended based on a plan (Nicholas, Nelson and Juergensmeyer 1991) which also means that developers know reasonably well when and where infrastructure will be provided in advance. The supply of land made available by such infrastructure investments is also known in advance. The planning and capital improvements programming behind impact fees reduces risk and uncertainty while expanding the supply of buildable land reasonably predictably.

Finally, recall what Brueckner (1997) found: impact fees can elevate the aggregate value of the community moreso than general taxation. The reason in part is because efficiencies are gained in matching revenues with impacts of new development.

The benefits of impact fees are probably easier to achieve in communities with them than without. Thus, between communities that are identical in every respect except with respect to impact fees, those with impact fees will generate more jobs at the margin than those without, all things considered. Put another way, impact fees do not dampen the construction of office, retail, and industrial projects, but rather facilitate such construction and as a consequence facilitate rather than drag job formation.

We note that the relationship between impact fees collected and job change hinges on construction. One may observe that in a changing economy, new construction may not necessarily be related to job change. We think it does, however. Review of space needs associated with retail, office, and industrial workers by Nelson (2003) shows remarkable consistency over the past two decades. While not a precise relationship, it is a reasonable one.

B. The Setting for Analysis

This report attempts to answer this question by examining the association between local economic development, defined here as change in jobs, and impact fees on the 67 counties of Florida during the period 1993 to 1999. Florida's 67 counties vary considerably with respect to size (7,000 to 2.1 million residents), economic growth (strongly positive to stagnation or even negative), and demographic characteristics (rich, urban, rural). The time-series aspect of the panel data follows the counties from 1993 to 1999 through economic cycles and varying levels of impact fee assessment. For example, in 1997 only about half the counties (34) assessed impact fees and, of
those that did, the total revenue collected was $196.9 million for the state as a whole and varied by county from $891 to $57.3 million. However, in 1993, total revenue collected from impact fees in those 34 counties was only $100.5 million. Reasons for growing revenue include a rebound from an economic recession affecting the state during the early 1990s, larger lists of facilities financed in part from impact fees, and larger assessments.

During the study period only about half the counties had jurisdictions collecting impact fees and of those where fees were collected the variation in aggregate county-wide collections was substantial. There thus exists among Florida's 67 counties sufficient variation in the data to prove the existence of the "boost-or-drag" effects of impact fees on job growth.

Florida is also an appropriate state to examine since it has arguably the most extensive history of applying rational nexus style development impact fees and therefore the most likely to reveal an observable cause-and-effect relationship between impact fees and tangible economic benefits (Nelson 1988; Nicholas, Nelson, and Juergensmeyer 1991).

C. The Data and Methodological Approach

The state of Florida collects data in a standardized format across all 67 counties, 405 municipalities and 1,178 Special Districts, including data on impact fees collected by one or more jurisdictions within the 34 counties where such fees are assessed. Beginning in fiscal year 1993, counties and municipalities in Florida were required by the state's Comptroller to include impact fee collections in their annual financial reports to the state. The great breadth (67 total counties with 34 having at least one jurisdiction collecting impact fees) and depth (7 years) of this dataset is conducive to both cross-sectional and longitudinal multivariate regression analyses, the details of which are reported in the Appendix. Another unique feature of Florida's public finance accounting data is the disaggregation of accounts. Often, revenues from exactions, impact fees and special assessments are co-mingled in the accounting process but Florida's impact fee dataset provides sufficient accounting and jurisdictional disaggregation to investigate the effects of local public finance policies. On the other hand, those data do not differentiate between types of development assessed such as residential, retail, office, and industrial.

For this analysis impact fee data for the Florida counties was assembled for the period 1993 to 1999 (Table 1). Levels of impact fee collections have been consistently rising for the state of Florida as a whole over the period 1993-99. Total impact fees collected over this period by the 34 counties are over a billion dollars ($1.22 billion). Within specific categories, transportation-related impact fees represent over half (54.0 percent) the total collected. At the other extreme, impact fee revenues for the Human Services, Public Safety, and Economic Environment categories together...
total only 12.2 percent of aggregate impact fee revenues. Thus, the revenues from impact fees are both substantial and diverse. (See Figure 1).
### Table 1: Levels of Impact Fee Revenues in Florida, 1993-1999

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<td>$4,066,993</td>
<td>$24,284,121</td>
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<tr>
<td>Total</td>
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<td>$155,870,433</td>
<td>$158,727,393</td>
<td>$196,893,478</td>
<td>$209,709,638</td>
<td>$257,753,336</td>
<td>$1,222,284,824</td>
</tr>
</tbody>
</table>

Source:

Figure 1: Percent Distribution of Impact Fee Revenues in Florida, 1993-1999, by Category
The Florida Statistical Abstract is published annually by the University of Florida Bureau of Economic and Business Research and provides a wide array of data consistent across time on human resources, physical resources and industries, services, public resources and administration, and economic and social trends. The Comptroller’s impact fee and BEBR datasets provide sufficient data to conduct cross-sectional multivariate analysis evaluating the association between development impact fees and key development indicators.

Very few studies in the refereed literature address the effect of impact fees on local economic development and some of these are methodologically flawed or otherwise lack analytical rigor. Further, there have been no published studies of the effects of impact fees on job growth. Granted that job growth is only one element of what constitutes economic development (job quality and stability, increased industrial diversity and integration, and higher wages are additional factors), higher employment is the most common metric, one that is both easily measured and socially and politically significant.

The analytical approach here relies on an analysis of panel data with both cross-sectional and time-series dimensions. Independently pooled cross-sectional analysis effectively increases the sample size to produce more precise estimators and test statistics with more power. Economic growth is affected by numerous factors including past growth, new investment, shifting industrial patterns, and demographics. It is practically impossible to introduce suitable data for all the diverse contributors to employment growth so the approach used here specifies a spatial fixed-effects model with dummy variables denoting particular region-sized geographic areas. These variables aggregately control for the idiosyncratic bundle of attributes present in the corresponding space.

D. The General Model

Because counties vary we need to employ regression analysis to separate the effects of numerous factors on local economic development from any impact fee relationships. The Appendix reviews the details of our model. The simple version of it is:

\[
\text{NEW-JOBS} \text{ are a function of:} \\
\text{IMPACT-FEES PER BUILDING-PERMIT} \\
\text{BASE YEAR EMPLOYMENT CHANGE} \\
\text{PROPERTY-TAX-PER-CAPITA} \\
\text{YEAR} \\
\text{REGION}
\]
New jobs are defined for our purposes as change in jobs from a base year, say 1993, and two years hence, 1995. This is our "dependent" variable; that is, its change is dependent on characteristics of the "independent" variables presented next. We calculate this change for every county for every two-year period from 1993 through 1997 (with the last year being 1999). In all, we have 335 observations (67 counties over 5 two-year periods).

The reason we track job growth from a base year is that we are interested in knowing whether impact fees collected in a base year may influence job change in later years. The choice of two, three, or more years may be arbitrary and perhaps any lagged arrangement would be reasonable. We chose the two year lag because it is probably the least amount of time needed to transpire between impact fee collections and the influence of fees on future employment.

The dependent variable NEW-JOBS, is influenced by "experimental" and "control" variables. Our "experimental" factor is IMPACT-FEES PER BUILDING-PERMIT issued in the first year of each two year period. The unit of analysis is all 67 counties including all cities in those counties. Although cities within counties vary in their impact fee practices, aggregation to the county level was needed to assure comparability among other control data that are available only at the county level. Moreover, like others, we consider that the smallest reasonable unit of a local economy to be the county (see Nelson, Drummond and Sawicki 1995). Consistent with our theory, we hypothesize a positive association between impact fees collected per building permit and job change.

The remaining dependent variables are called "controls" because they account for important differences between counties. BASE YEAR EMPLOYMENT CHANGE is the change in jobs within each county between the prior year and the base year of analysis. Growing counties tend to create an atmosphere that attracts more growth, so by controlling for growth inherent with growing counties we are better able to tease out influences of impact fees on sustaining growth. We expect a positive association between past job growth and future job growth (Nelson, Drummond and Sawicki 1995). PROPERTY-TAX-PER-CAPITA is the property taxes collected in the previous year divided by population of the base year. It controls for any effects property taxes may have on job growth but the literature on the relationship between them is unclear (Nelson, Drummond and Sawicki 1995). YEAR is the base year of each two-year period. It helps to account for differences between counties that occur during any given year such as a momentary blip up or down in one county's economy relative to others. There is no expected direction of association expected a priori. REGION is a variable representing the eight economically homogeneous regions devised by the State Comptroller's Department of Banking and Finance within which each county is assigned. It controls for differences in social, economic, demographic, and growth dynamics among counties based on the region within which they are located. There is no expected direction of association expected a priori.
A word on collinearity is needed before proceeding with results. It seems obvious that if impact fees are assessed on only new development, then the more development there is the more fees will be collected. Hence, we are initially worried that any measure of association between impact fees and job growth would be circular: jobs reflect growth which is assessed fees. We employed a number of tests to assure that our analysis teased out effects of impact fees reasonably and they are reported in the appendix. Keep in mind, however, that our dependent variable is impact fees collected per building permit issued. This creates a standardized way to compare differences in impact fees between counties. If high fees in one county burden economic development more than in another, then we should see job change lag behind those counties, all things considered.

E. Results

Our statistical analysis (presented in detail in the Appendix) finds a significant positive association between impact fees collected per building permit and job change over two years. This finding holds even when controlling for base year employment growth, property taxes per capita, the value of local building permit activity, regional, and other factors. This finding confirms our hypothesis that impact fees spent on infrastructure development are not a drag on local economies with respect to job growth but, instead, can be beneficial to local economies. A conservative interpretation would at least claim that no discernable adverse economic impacts from impact fees could be found. A liberal interpretation of these model results would argue that the imposition of impact fees typically results in substantial positive effects on local employment, at least in Florida during the 1990s.

V. Conclusions and Policy Implications

The results of statistical analysis reveals significant positive effects of impact fees on job growth even when controlling for property taxes, regional and demographic effects, and other factors. These analytical results provide counter-arguments to public officials anxious to fund local infrastructure projects in the face of persistent taxpayer resentment. Convincing arguments can be made to taxpayers that spending on impact fees represents an investment in their community.

The controversy over impact fees will likely remain; it has already endured over 20 years. Developers will still complain that impact fees drive away customers to lower price localities (Sobel 1996). But for very practical, not theoretical, reasons impact fees will remain an important mechanism for growing communities to finance local infrastructure needs. Impact fees are really
nothing more than an invention by locally elected officials to solve the problem of providing infrastructure to sustain development in rapidly growing areas: theoretical debate has followed pragmatism.

The positive association between impact fee revenues and job growth found in this study should not be misconstrued to mean that increasing impact fees will always result in job growth. That relationship may exist for many of the counties studied but might not hold for counties experiencing low or declining growth or an oversupply of existing infrastructure. Development impact fees cannot be considered a panacea for boosting local employment in all circumstances but these results suggest that given the right economic environment, impact fees can directly fund vital infrastructure improvements and indirectly promote local employment at the same time. In other words, impact fees are not a drag on local economies that are growing and may indeed be needed to sustain growth if the alternative is insufficient to expand infrastructure to meet the needs of new development.

We recommend that all growing states and especially growing communities everywhere consider the implications of our findings. Certainly impact fees may be unpopular to influential interests but our findings suggest without them economic growth may be compromised if growing communities are unable to generate other sources of new revenue to expand infrastructure to meet the demands of growth. Given tax limitations and growing demand for investment, communities in growing regions that have impact fees may become more prosperous in the long run than communities in those regions that do not have them.

7 The first leading case on rational nexus style impact fees was City of Dunedin v. Contractors and Builders association of Pinellas County, 358 So. 2nd 846, litigated in 1976 and decided in 1978.
APPENDIX

Here we present our detailed model and statistical analysis.

Model The model tests the association between impact fees and job formation:

\[
(1) \quad \text{NEW-JOBS}_{t(b) - t(a)} = B_0 + B_1 \text{IMPACT-FEES/BUILDING-PERMITS}_{t(a)} + B_2 \\
\quad \text{BASE YEAR EMPLOYMENT CHANGE}_{t(a)} + \\
\quad B_3 \text{PROPERTY-TAX-PER-CAPITA}_{t(a)} \Sigma B_i \text{YEAR-DUMMYIES}_{t(a), i} + \\
\quad \Sigma B_j \text{REGIONAL DUMMYIES}_{t(a), j} + u;
\]

where,

- \text{NEW-JOBS}_{t(b) - t(a)} is a vector of the change in employment in all counties between a given year, \(t(b)\), and a base year, \(t(a)\);
- \text{IMPACT-FEES/BUILDING PERMITS} is a vector of impact fees collected by each county between a base year and the previous year divided by the value of building permits issued for the same period;
- \text{BASE YEAR EMPLOYMENT CHANGE} is a vector of the change in jobs in each county between a base year and the previous year.
- \text{PROPERTY-TAX-PER-CAPITA} is a vector of county property taxes collected between a base year and the previous year divided by the population for the base year;
- \Sigma B_i \text{YEAR DUMMYIES} is a vector of year dummy variables (i=1-4);
- \Sigma B_j \text{REGIONAL DUMMYIES} is a vector of regional dummy variables (j=1-7); and
- \(u\) is the stochastic disturbance term.

(2) A second formulation of the model substitutes the dummy variable \text{IMPACT-FEE}, set to unity if impact fees are collected by a county and otherwise set to zero, in place of the \text{IMPACT-FEES/BUILDING-PERMITS} variable.

If impact fees are a form of capital formation,

\[
(3) \quad \delta \text{NEW-JOBS}_{t(b) - t(a)} / \text{IMPACT-FEES}_{t(a)} > 0;
\]

but if they are a tax on capital,

\[
(4) \quad \delta \text{NEW-JOBS}_{t(b) - t(a)} / \text{IMPACT-FEES}_{t(a)} < 0.
\]

The dependent variable, \text{NEW-JOBS}, is the change in the number of jobs resulting from the imposition of impact fees from the year in which the fees were collected, \(t(a)\), to a later year, \(t(b)\). The signs of the \text{IMPACT-FEES/BUILDING PERMITS} and \text{IMPACT-FEES} explanatory variables are indicative of the "boost-or-drag" employment effects of the fees. A log-linear transformation of the data series will permit interpretation of the explanatory variable coefficients as semi-elasticities as well as detrending (with year dummy variables) the time-series data to account for price inflation.

An important consideration in the model specification is the time lag, \(t(a) - t(b)\), between the imposition of an impact fee in a given year and the measurable manifestation of the resultant economic effects, if any. The revenues collected from impact fees are disbursed through capital
improvement programs (CIP) that typically operate for five or six years. It seems reasonable to expect that the economic effects such as job gains should be measurable mid-way the CIP cycle on any one project, here taken to be two years. Thus the time lag between collection of the fee and resultant employment effects will be two years.

**Dependent and Independent Variables.** NEW-JOBS -- The dependent variable is the change in county-wide employment between a base year, \( t(a) \), and a later year, \( t(b) \). The quantity NEW-JOBS reflects, in part, investment decisions made at \( t(a) \) which affect the subsequent level of employment growth at \( t(b) \).

**Experimental Variable**

IMPACT-FEES/BUILDING PERMITS -- Aggregate county-wide impact fee revenues for a given base year, \( t(a) \) divided by the aggregate value of all county building permits for the same year. This explanatory variable normalizes county impact fee revenues by the value of building permits issued in that county for that year producing a relative measure of the importance of impact fees in the local economy. If NEW-JOBS is positively related to the IMPACT-FEES/BUILDING PERMITS explanatory variable, then impact fees may be viewed as a beneficial form of capital investment. At a minimum, a positive sign on this variable implies that impact fees are not detrimental to local job growth and economic development. If negatively correlated with NEW-JOBS, then impact fees can plausibly act as a tax on capital, stifling local job growth.

IMPACT-FEES -- A binary variable which assumes the value of unity for counties collecting impact fee revenue for a given base year, \( t(a) \), and a value of zero otherwise. Use of a dummy variable eliminates the influence in the model of the nominal size of impact fees collected in a county. As with the IMPACT-FEES/BUILDING PERMITS variable, if NEW-JOBS is positively correlated with the IMPACT-FEES explanatory variable, then impact fees can be viewed as good for job growth.

**Control Variables**

BASE YEAR EMPLOYMENT CHANGE -- The change in county-wide employment between the base year in which impact fees are collected, \( t(a) \), and the previous year, \( t(a-1) \). BASE YEAR EMPLOYMENT CHANGE controls for the effects of the economic environment in the base year on subsequent (2-year lagged) employment.

PROPERTY-TAX-PER-CAPITA -- County-wide property taxes revenues for a given future year, \( t(a) \), divided by the population of that county for that year. The expected correlation to the dependent variable is ambiguous depending on the effects of the tax. The traditional view is that high property taxes can redirect investment capital from economic development. A contrasting and increasingly appreciated view is that high property taxes reflect high quality services and a high quality of life, both desirable characteristics of firms and households choosing a place to locate. Moreover, since many local governments give property tax concessions to lure targeted economic development opportunities, such firms benefit from higher taxes paid by everyone else. No direction of association can be predicted with much reliability (Nelson, Drummond and Sawicki 1995).

YEAR DUMMIES -- The intercepts on the year dummy variables account for the likely possibility that the model's explanatory variables have different variance distributions in different time periods. Log-linear transformations of the model including the year dummy variables will effectively detrend the time-series data. Calendar year (CY) 1993 is taken to be the reference year.

REGIONAL DUMMIES -- The spatial fixed-effects model uses binary variables to allow for regional variation in the economic environment. These dummies aggregately control for the particular bundle of attributes present in a region including the demographic characteristics of the population (age,
race, and education) and other sources of regional variation. The Florida Comptroller's Department of Banking and Finance has divided the 67 counties into eight economically homogenous groupings: Pensacola/Northwest, Jacksonville/Northeast, Orlando/Central, West Palm Beach/Southeast, Miami/South, Ft. Lauderdale/South Central, Ft. Myers/Southwest, Tampa/West Central. The Pensacola/Northwest region will provide a reference for the regions to the south.

Statistical Analysis The empirical results of the pooled cross-sectional regression analyses are presented in Table 2. Two models are presented, each with the dependent variable the natural logarithm of the lagged (2-year) change in employment. For the cross-sectional analysis the last year analyzed was 1997 because of the two-year lag in the dependent variable; the most recent employment data from BEBR was 1999. The coefficients of both models consistently reflect a significant positive effect of impact fees on job growth even when controlling for base year employment growth, property taxes per capita, the value of local building permit activity, regional, and other factors.

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<td>Model 1: Log-linear Functional Form</td>
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<tr>
<td>Dependent Variable</td>
<td>Lagged 2-year Change in Employment</td>
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<td>Explanatory Variables [Std. Error]</td>
<td>Impact Fees, Value of Building Permits, 14.911 [1.84]</td>
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<td>Impact for Decennial</td>
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<td>Central Variables [Std. Error]</td>
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<td>Value of Building Permits</td>
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* The Florida Comptroller's Department of Banking and Finance definitions of the eight economic regions can be found at http://www.dbf.state.fl.us/regions.html.
Initially Model 1, a log-linear functional form, produced a positive (+12.075) but marginally significant coefficient (t=1.964) for the explanatory variable IMPACT-FEES/BUILDING PERMITS. A Breusch-Pagan test indicated a possible problem with heteroskedasticity (p=0.074, Lagrangian Multiplier = 20.71). A Generalized Least Squares estimation approach was used to correct for heteroskedasticity. The results reflect a positive coefficient (+14.898) and higher significance (t=8.86) for the IMPACT-FEES/BUILDING PERMITS variable. This significant positive association endorses the hypothesis that impact fees spent on infrastructure development are not a drag on local economies with respect to job growth but, instead, can be beneficial to local economies.

Of particular concern in a model with several potentially related predictors is collinearity. The variance inflation factor (VIF) for the IMPACT-FEES/BUILDING PERMITS coefficient was 2.344, substantially less than the rule of thumb of VIF > 10.0 (Kleinbaum 1988) for problematic collinearity characteristics. Similarly, computations of the eigenvalues of the correlation matrix show a minimum eigenvalues of 0.112 and a maximum condition index of 4.951. Belsley, Kuh, and Welsch (1980) recommend interpreting a condition index of 30 or more as reflecting moderate to severe collinearity so no significant problem with collinearity is indicated. Additionally, the variance proportions of the principal components do not reflect high loadings onto multiple components with large condition indices, again reflecting acceptable collinearity characteristics.

The coefficient for the PROPERTY-TAX-PER-CAPITA variable is significant and greater than zero indicating a positive relationship between tax and resultant job growth as with the IMPACT-FEES variables. As noted, the expected correlation to the dependent variable can be ambiguous depending on the effects of the tax in a particular setting. Given the positive sign and high significance of the PROPERTY-TAX-PER-CAPITA variable, it is plausible to conclude that property taxes do not exert a chilling effect on job growth in the Florida case.

None of the year dummy control variables were statistically significant. Compared to the Pensacola/Northwest reference region, the Orlando, West Palm, Fort Myers, Tampa and Fort Lauderdale regions fared better with respect to employment increases during the period 1993-1997. The Jacksonville and Miami regions performed relatively less well than the Pensacola region. The aggregate nature of the regional dummy variables makes detailed interpretation of constituent causal factors impossible.

Model #2, also a log-linear functional form, uses the explanatory dummy variable IMPACT-FEES in place of the IMPACT-FEES/BUILDING PERMITS variable as potentially indicative of the effects of impact fees on job growth. The IMPACT-FEE binary variable indicates the presence of an active impact fee policy in a specific county. Computations of the eigenvalues of the correlation matrix show a minimum eigenvalues of 0.5 and a condition number of 7.1, neither of which indicate a significant problem with collinearity. A Breusch-Pagan test indicated substantial heteroskedasticity (p=0.0005 and LM = 34.7).

Again, GLS estimation of the model reduced heteroskedasticity and produced a positive coefficient (+0.692) and high significance (t=8.32) for the IMPACT-FEES dummy variable. This highly significant positive association again confirms the hypothesis that impact fees can positively benefit local employment. Interpreting the IMPACT-FEES coefficient as a semi-elasticity for the response of employment to impact fee spending, a 1 percent rise in the amount spent on fees for a given level of value of building permits in 1996 is associated with a 99.8 percent rise in employment over the two subsequent years.

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8 After Wooldridge (2000)

21
In summary, results from GLS estimation of both models consistently indicate a positive association between impact fees and employment. The values for both IMPACT-FEE coefficients seem higher than would be expected and will be the subject of further scrutiny. A liberal interpretation of these model results would argue that the imposition of impact fees typically results in substantial positive effects on local employment, at least in Florida during the 1990s. A more conservative interpretation would at least claim that no discernable adverse economic impacts from impact fees could be found.
REFERENCES AND SELECTED BIBLIOGRAPHY


CASES

Associated Home Builders v. City of Walnut Creek, 4 Cal. 3d 633, 638, 484 P.2d 606, 610, 94 Cal. Rptr. 630 (1971), appeal dismissed, 404 U.S. 878 (1971)

Banberry Devl. Corp. v. South Jordan City, 631 P.2d 899 (Utah 1981) [at 904]

Broward County v. Janis Development Corp., 311 So.2d 371 (Fla. 4th Dist. 1975)

Call v. City of West Jordan, 606 Pa.2d 217 (Utah 1979)

City of Arvada v. City and County of Denver, 663 P.2d 611 (Colo. 1983)

City of College Station v. Turtle Rock Corp., 680 S.W.2d 802 (Texas 1984)

City of Dunedin v. Contractors and Builders Association of Pinellas County, 358 So. 2d 846 [Fla. 2d DCA 1978])
City of Fayetteville v. IBI Inc., 659 S.W.2d 505 (Ark. 1983)
Contractors and Builders Association of Pinellas County v. City of Dunedin, 329 So.2d 314 (FL 1976), cert. denied 444 U.S. 867 (1979)
Hollywood Inc. v Broward County, 431 So.2d 606 (Fla.4th DCA 1983), cert. denied 440 So.2d 352 (Fla. 1983)
Home Builders and Contractors Association v. Palm Beach County, 446 So.2d 140 (Fla. 4th DCA 1983), cert. denied 451 So.2d 848 (Fla. 1983)
Homebuilders Ass’n v. South Jordan City, 631 P.2d 899 (Utah 1981)
Lafferty v. Payson City, 642 P.2d 376 (Utah 1982)
YOU ARE HOW YOU SUBDIVIDE

A Renewal of Traditional American Subdivision Design

Traditional American Subdivision Design example. Modern American Subdivision Design example.

Not so “bad” after all? American Traditional Subdivision design was focused on people’s accessibility to places. In colonial times and through the mid-1900’s this configuration maximized pedestrian accessibility to community focal points and places. By the 1930’s this was considered “bad” subdivision design.

Not so “good” after all? The advent of the automobile changed subdivision design to cater to the automobile primarily, as well as to isolate pockets of residential activity from vehicular traffic. The hierarchy of streets to accommodate traffic flow thus drove subdivision design. By the 1930’s this was considered “good” subdivision design.

Arthur C. Nelson, Ph.D, FAICP
Douglas C. Allen, AIA, AICP
Richard L. Dagenhart, AIA, AICP
John J. Skach

Georgia Institute of Technology
April 2002
PREFACE

For most of the history of settlement of the North American continent and especially the contiguous states of the United States, the subdivision of land to create urban places has stood the test of time. Multiple generations conformed land use and development activity around the central themes of Traditional American Subdivision design: 1) maximizing accessibility of pedestrians to places; 2) focusing attention to focal points or places; and 3) making it possible for future generations to renew how land is used efficiently. For the most part, Traditional American Subdivision design created very dynamic places.

Somewhere along the way we got some of it wrong. The automobile combined with notions of what constitutes quality of life led architects and planners at the beginning of the 20th Century to reform subdivision design. In our cover we show what the Federal Housing Administration in the 1930’s explicitly viewed as “good” and “bad” subdivision design. Not a few great personalities were involved in this shift in urban design paradigms such as Lewis Mumford, Harland Barthomew, Clarence Perry, Clarence Stein, and others. These were men of vision, trying to recreate subdivision design to accommodate the automobile and making more pleasing residential environments.

Modern subdivision design, however, abandoned the themes central to Traditional American Subdivision design. Instead of maximizing accessibility between land uses, modern subdivision design intentionally divorced them. Instead of creating clearly linked focal points in the community, modern subdivision design isolated people from visible community connections. Instead of creating a template that facilitates change in land uses efficiently over time, modern subdivision design aims to preclude change.

Times are changing. The New Urbanism movement is gaining momentum but remains illusive conceptually to most Americans. Yet, what they may understand intuitively is that subdivisions, especially residential subdivisions, need to put people first but of course not without accommodating the automobile. Also, Americans are concerned about investment in their homes and whether certain configurations of land uses promise more or less return on their investment. The ultimate effect of modern subdivision design may be to create future generations of low density, single-use residential slums that – because of their configurations – may be very difficult to change. Traditional American Subdivision design, in contrast, appears readily adaptable to change.

There are a lot of things right with Traditional American Subdivision design and not everything about modern subdivision design is wrong. We aim in this report to the Brookings Institution to take the best of the old and the new to recreate Traditional American Subdivision design.

Chris Nelson
Doug Allen
Richard Dagenhart
John Skach
Atlanta, Georgia
April 2002
YOU ARE HOW YOU SUBDIVIDE

Since its settlement by western Europeans, America has been "open season" for the acquisition, subdivision, and development of land. Although Native Americans occupied it, it was European monarchies who claimed "title" to it initially. To induce settlement of the New World with all its uncertainties, monarchies deeded large parcels of land to those subjects who would move across the ocean. From the late 18th Century through the 19th Century, title to the land not held by monarchies was transferred to the newly formed United States either by war or purchase. For its part, Congress induced settlement of the western territories through homesteading grants. It also used land to stitch the nascent country together through grants of land to railroads.

Of the 1.9 billion acres of land in the contiguous states, more than 1.3 billion areas is owned privately. Nearly all of the United State's 280 million people live and nearly all of the nation's 100 million workers work on privately owned land. It is with some certainty that the land they occupy was subdivided out of larger tracts. While much is said today bemoaning the current distribution of and interaction between land uses, very little is said about how we got to where we are.

So, what do we have now? We know that the act of subdividing land along with dedicating rights-of-way to the public so the subdivided parcels can be accessed forms the street network, and this network becomes the template upon which development occurs and changes over time. Buildings come and go but the street network designed principally to access subdivided land survives. We are coming to realize that some subdivision designs and associated street networks facilitate changing development needs but others inhibit it.

The thesis we offer here is that much of our current land use patterns did not come about accidentally but by consciously dividing land in ways to achieve certain outcomes. In short, much of the current distribution land uses and their interaction is a product of how we subdivided land to begin with. If we want to change the distribution and interaction of land uses, we can start with reconsidering how we subdivide land. We begin with a review of how land was subdivided before the Great Depression, we continue with a review of the twin influences of the Garden City movement and the rise of federal housing and financial agencies in shaping mostly suburban development patterns, and we conclude with an assessment of where we can go from here to reshape land use patterns of the next generations. We will show largely that subdivision practices before the Garden City movement and involvement of federal housing and financing agencies in subdivision design are the more lasting, flexible, and humane. But first some background on subdivisions as the ultimate determinant of urban form.

SUBDIVISION AS THE DETERMINANT OF URBAN FORM

Is a subdivision of land for the purpose only of expediting the sale of land or is its purpose also to shape the urban form for generations to come? The two purposes are, of course, linked. To the land owner wishing to sell, subdividing it promises quick delivery of cash. To the initial owners of the newly subdivided land, they are able to afford an amount of land they can afford and use it for immediately productive purposes. But as the new owners come and go, how their subdivided lot is used changes over time. Eventually, the entire fabric of urban development, the urban form, is dictated by the historical pattern of subdividing land. Indeed, the subdivision of land is as old as the first line drawn by humanity in the sand to indicate possession, and it has been used throughout the centuries to give order to the environment. The grid of Manhattan, the patchwork of Dutch polders, or the imperial organization of Beijing are results of the act of partitioning land into smaller components, and it essential to understand the direct connection between initial choices and the ultimate and lasting landscape form.
Traditional American cities are shaped substantially by the subdivision of land into streets, blocks and lots. Lots efficiently and profitably dispose of land, and facilitate settlement patterns. Streets provide access to the lots. Blocks to organize the two ultimately giving shape not only to the tract that is being subdivided but to the larger urbanized area as a whole.

Subdivisions themselves are the visions of their subdividers. William Penn envisioned Philadelphia as a significant contributor to American colonies and so his design was intended to both current and future development needs. His design was decidedly influenced by his vision of Philadelphia in a hundred or a thousand years. The speculative nature of the land and gold rushes of 1800s, on the other hand, emphasized the creation of lots for immediate disposal to meet immediate needs. Towns were platted, of course, but they were based on repetitive sets of lots or plats.

Over time, when waves of immigration and rapid urbanization brought with it the congestion of streets, subdivision regulations moved from being simply a recording devise to a tool in which to upgrade urban conditions. A hierarchy of streets came to be codified so that large shares of traffic would be focused on a few large streets, leaving residential areas free from congestion. The congestion about which we are talking is not necessarily of automobiles although that is the current concern. Congested streets of the late 19th Century were seas of animals and the loads they pulled, and people riding on them or in carriages pulled by them. Animal waste and associated odors were prevalent. Congestion then probably implied far greater social discomfort than it does now.

Changes in the purposes of streets, especially guided by the desire to create an hierarchy of streets, were addressed in model subdivision regulations crafted initially by the Federal Housing Administration and later by the American Planning Association. As the impact of human activity on the landscape and society as a whole became understood better, so did expectations of subdivisions. The typical modern subdivision ordinance in rural Kansas or urban Long Island include requirements for open space, drainage, utilities, sidewalks, and a whole host of technical engineering standards. Lost in the past century of reshaping subdivision standards to meet changing needs is the fundamental influence subdivisions have on shaping urban form through the layout of lots, streets, and blocks.

In this report we do three things. First, we pose the American Traditional Subdivision. It is based on a history rich in civic and corporate subdivision design that share surprisingly common elements - creating the American tradition of subdividing land. Second, we discuss recent findings showing that traditional subdivision patterns on the whole lead to better psychological and social outcomes than standard suburban subdivisions. Third, we pose principles to guide or shape the future generations of subdivisions in America.

THE AMERICAN TRADITIONAL SUBDIVISION

America is a nation of cities built on grid plans, regardless of their origins in land speculation, religious freedom, or civil control. John Reps wrote in 1965:

_The gridiron plan stamped an identical brand of uniformity and mediocrity on American cities from coast to coast...Cities with other types of plans always constituted a distinct minority. We now view most of these gridiron plans with distaste. Their lack of beauty, their functional shortcomings, their overwhelming dullness and monotony, cause us to despair. Although new patterns are beginning to emerge in our burgeoning suburbs, the great grids of the central cities remain virtually unaltered even under the impact of our growing modern redevelopment projects._ (Reps 1965: 314.)
It is paradoxical that while the grid is considered a great classical planning achievement, sympathetic to not only America’s designs on a civilization with Greek and Roman antecedents but also to the overwhelming rationalism of the industrial age, it has been generally viewed as a liability by the planning and engineering professions. Yet the grid in its most sublime form gave America both San Francisco and New York. The street is subservient to the private lot instead of in its traditional role as public space. Reps condemnation of the grid plan stemmed from its indiscriminate application by speculators who were ignorant in the art of making a town. His ideal grid is refined with squares, parks, axial streets and meandering pathways. This vision holds the key to the timeless qualities of the grid as an extremely flexible, ultimately expandable, completely connected system that can accommodate multiple landscapes and infinite architectural futures. The grid can comfortably hold the ward system of Savannah or the culture of congestion of New York.  

Unfortunately, the modern American suburb is designed not with town planning principles but instead as a sequence of subdivisions as a standardized product, applied nationally with only token modifications to local landscapes and circumstances (Easterling 1999).

In the following sections we review uniquely American urban forms that have been all but forgotten until recent years. Those forms reflect an America that is based on its major regions, cultures, histories, and view of people’s relationship with distinct environments. We will return to the lessons these prototypes offer for future generations.

*Gordon’s View of Savannah, Georgia, 1734.*

**Towns of Authority: The Law of the Indies and English Commonwealth Towns**

Five climate zones and a continent’s distance separate the colonial towns of New Spain and New England. Santa Fe, New Mexico and Woodbury, Vermont are pristine examples of each tradition. Despite their visual dissimilarity both are based on ideas of communal ownership and concise instructions on how to subdivide the land. These instructions were based on distant authorities: The Spanish monarchy and the English colonial companies that both drew on European feudal land ownership as inspiration. Reps observes:

*In the case of the English colonies this system of land distribution clearly stemmed from the conditions of land tenure in rural England at the time of feudal land law... It seems a justifiable*
hypothesis that the Spanish pueblo land system similarly owed its origins to the pattern of feudal land holding in Spain... In America the municipality, Spanish pueblo or New England town, replaced the feudal lord. (Reps 1965: 54).

The Spanish planning legacy in America is based on the Law of the Indies, adopted by Spain in 1573, governing street plan, plot disposition, common elements, the siting of buildings, and other elements, in colonial towns. Its exacting detail was a response to the high degree of risk and hardship in settling a frontier, leaving little room for chance in platting frontier towns. Indeed, its recommendations for choosing a town site could be considered best practices today: selection of high, dry land; an adequate supply of water, fuel and building materials; room for future expansion; and, development controlled by a master plan. Foremost was the creation of a central market plaza prescribed generally as 400 by 600 feet but tied proportionately to the estimated future population. Four main streets leading from the hinterland intersect the plaza midway on each side and lesser streets emanate from the corners, inscribing the plaza into a grid. The principal streets and the plaza were to be flanked by arcades, and public buildings located around the plaza’s perimeter. House plots were drawn by lottery -- the origin of the modern expression *lot.*

St. Augustine, Florida. Spanish Colonial Law of the Indies

New England villages or ‘townships’ were composed of the town unit and the surrounding agricultural lands. The colonial companies, such as the Massachusetts Bay Company, were granted large tracts of land by the crown to divide amongst the shareholders who subdivided their holdings among dependents, relations or other individual associates. Houses were placed, often by consensual agreement, uniformly back a limited distance from the road, and the rear lots served as gardens and livestock-yards. Croplands were arranged around the township core in large ‘common’ fields that were agglomerations of individual
strip subdivisions. Each parcel owner was entitled to whatever grew on his plots. Although technically not in common ownership, a field nevertheless was collectively fenced, cultivated and managed. At the fringes of the township were truly common grazing and forest lands, while at the center of the town unit was the 'commons' or the village green. Unlike towns in New Spain, the New England village is generally not a gridded plat even though both grid and linear plans were used until the middle 1800s. The memorable visual quality of those townships come from their unique treatment of the landscape and simple buildings constructed along streets (Reps 1965: 128). Because subdivision was not regulated by code but was instead a result of local situations and collective consensus, town plans are often an amalgam of various platting initiatives.

Although they lacked specific regulatory codes such as the Laws of the Indies, the New England Puritan Township exerted tremendous influence on the American Suburb through its transformation by Frederick Law Olmsted and Calvert Vaux at Riverside, near Chicago in 1869. These “Olmstedian” suburbs dominated residential subdivision practices until they were overturned in the first quarter of the 20th Century by the influence of Clarence Stein and Henry Wright’s Plan for Radburn, New Jersey.

Towns of Benevolence: Philadelphia and Industrial Towns

Unlike towns of New Spain and New England, "Towns of Benevolence" were designed to achieve specific social outcomes. Consider Philadelphia, which was the great achievement of William Penn. It was one of his many efforts to create sanctuary in the New World for his fellow Quakers, who sought religious if not personal tolerance. The familiar plan of Philadelphia has a timeless quality owing to the simplicity and balance of its constituent parts: two main streets, 100 feet wide and perpendicularly opposed; a central square at the intersection of the two main streets; a regular grid of lesser streets, each 50 feet wide, superimposed on the Market/Broad street axes; and a public square, reserved for “public buildings of various kinds” in each quadrant. A 10 acre square was set aside in the center at the intersection of the two main streets and reserved for public use. Although Philadelphia would not actually build its City Hall on this square until the second half of the 19th Century, the initial plan subdivision set aside the square for such a purpose. Penn’s humanism, and his exposure to the Great Fire of London in 1666, fueled his vision of a “green country town” where houses were surrounded by
gardens and where each quarter of the city had access to its own central park. Penn was familiar with the layout of London’s residential squares and drew on that precedent. Centuries later city planners would seize the idea of a ‘neighborhood unit’ as the solution to problems of urban growth. Far from strictly functional, Penn’s weaving of these neighborhoods into the framework of monumental commercial streets gave the plan a sublime quality that was matched only by Oglethorpe’s Savannah. The genius of Philadelphia is that it was America’s first intentionally layered city; a grid organizing an equitable distribution of land, given a symbolic focus by the axial effect of Broad and Market on City Hall, humanized by its neighborhood squares, and held together by an indexical street system that “democratized” the block and lot by a system of numbered streets.


Towns built by industry are an interesting contribution to American urban planning. For example, Lowell, Massachusetts used innovations in social planning less out of a commitment to humanism than as a way to reassure Yankee farmers that their daughters would be in safe hands. Those innovations included housing young women in separate buildings (because men would not operate power looms), separating major land uses by greenfields, and connecting housing with industrial buildings directly. On the other hand there was Pullman IL where the paternalism of its founder degenerated into despotic control of his workers’ lives. The plan of Pullman is a thoughtful extension of the Chicago grid including places for public buildings and parks, but its strong points were overshadowed by the labor revolt of 1874, who protested inhumane living and working conditions.

To know Expedience: Railroad and Speculative Prototypes

After the Revolutionary War, the former crown lands west of the Allegheny Mountains were subject to disputes in claims of possession by some of the former thirteen colonies, as well as pressure from large land companies and individuals desiring a stake in farmland. In short order in the early 19th Century the United States acquired the Louisiana Purchase and annexed the Northwest Territories. There arose the need to simplify deed records beyond usual metes-and-bounds descriptions of parcel boundaries. To do this, Thomas Jefferson and Hugh Williamson with the rest of the Continental Congress in 1785 devised a uniform grid of six-mile-square townships in longitudinal bands, or ranges, extending west from the
western border of Pennsylvania to the Pacific Ocean. Half of the townships were further subdivided into thirty-six square-mile sections, with the sixteenth section in each township retained for public use. The idea behind the Land Ordinance was that the divisions would allow the government to efficiently sell and record the individual purchases made by the rapid wave of settlers into the territory, with “quarter sections” intended for yeoman farmers and townships for the larger land companies.

Initial settlement was slow because of the threat of Native American attack, and because the minimum sale of one section was beyond most individuals’ means. Once frontier outposts like Chicago were settled, however, a great land rush lasting through the nineteenth century turned farmland into scores of speculative subdivisions and overnight cities that often failed to meet the expectations of buyers back East. Many such places were abandoned and vanished, but those that survived retained the hasty subdivision imprint exemplified by Chicago: a regular grid of lots and blocks inscribed into the framework of the square-mile sections, extending to the horizon with almost no provisions for public parks, squares or topography. The rural landscape also bore marks of the Land Ordinance in the rectangular pattern of fields, roads and towns throughout the Heartland. Roads logically follow section lines, while settlements were established at crossroads.

The pattern of land division created by the Ordinance Survey was used to award to land grants as incentives for railroad construction. Beginning in 1850, the federal government deeded square-mile sections alternating on either side of a proposed line to railroad companies in hopes that the rail infrastructure would induce settlement, and sale, of the remaining federal land. The resulting ‘railroad towns’ were templates developed by the rail companies that were stamped out along the lines. As exemplified by the Illinois Central, the typical railroad town was a grid of roughly square blocks oriented toward the rail line, which ran through the center of town. On either side of the 200’ track right-of-way were the main commercial streets, both 50’ wide, followed by parallel ranks of 70’ residential streets. Cross-streets, also 70’ wide, were symmetrical about the passenger and freight depots. The railroad towns were highly speculative, not only from the activities of the railroads’ land development associates and individual speculators, but because of the uncertainty of the town’s future after the railhead was advanced further along the line. The towns that survived did so either by retaining railroad shop and transfer facilities, or by convincing state governments to locate capitals, colleges, hospitals and prisons within their limits (Reps 1979).

**THE NATIONAL LAND ORDINANCE RECONSIDERED**

In the 1920’s the great grid of the Midwest and Western states, implemented as a result of the National Land Ordinance of 1785 came under attack by architects and planners. (Mumford, Tunnard) The majority of this criticism concentrated on three points: 1) The grid became the tool of the speculator, seeking to own the subdivided parcel only long enough to claim title and resell to settlers arriving from the East.; 2) The form implied by the square subdivision did not respond to topography; and 3) It was inflexible and did not allow for creativity or variety in the layout of blocks and streets. A reexamination of the Land Ordinance and its resulting grid indicates that these criticisms were perhaps not well founded. First, land speculation does not require a particular formal arrangement. Speculation was indeed rampant, but owed far more to the rate at which raw land was converted to agricultural and urban settlement than to the shape of the subdivided parcels. Second, one of the most interesting aspects of the grid occurs when it encounters a difficult topographic condition. Within the larger subdivision, streets and roads indeed did curve in response to topography in many cases; in others it simply stopped, adjusted for the condition, and picked up again when circumstances were more favorable. Third, it may have been one of the most flexible systems of subdivision ever devised. From it, came urban San Francisco, as well
as rural Kansas. The inherent flexibility came from the manipulation of a series of dimensional attributes derived from the continuous halving of 640 acres (one square mile), down to urban blocks of 300 feet by 300 feet, with 60 ft. rights-of-way interspersed between. When conditions required, blocks could convert to a 300 to 600 ft. dimension with 60 ft. right-of-way. Townships were composed of 36 sections, one square mile each. Thus, each section could be subdivided into four 160 acre quarter sections, the typical family farm of the 19th century. By continuous halving, the 160 acre parcel could be subdivided into 40 acre parcels; 40 acre parcels could then be further subdivided into 10 acre parcels, and 10 acre parcels subdivided into 2.5 acre parcels, resulting in an urban block of 300 by 300 ft.
Although no specific provisions were made for towns, the 16th section was set aside as the “school district” and for the courthouse. Towns, even “speculative” ones, grew up around these two early civic institutions. Because of its inherent flexibility and ease of surveying, deeds could be transferred easily, and parcels could be sized to accommodate an extremely wide and varied number of land uses over time.

**TOWN OF BENEVOLENCE -- MEET TOWN OF SPECULATION** The “town of benevolence” and the "town of speculation" are direct results of decisions made during the subdivision of land. Consider two in the same state: Savannah and Atlanta.

**Savannah** The renowned street and square plan of historic Savannah was specified by Governor James Oglethorpe’s plan of 1733. Like many other English colonies, Savannah was intended as a utopian alternative, defensive outpost against the Spanish, and a profit making venture aimed at supplying silk for manufacture and export. The origin of and precedents for the plan have been the subject of intense debate. While it is possible that Oglethorpe’s role as a prison reformer may have had something to do with Savannah’s unique ward system, a more likely source are the various treatises on the “Ideal City” that had filtered into England from Italy by the early 18th Century. The essence of the plan was the Ward: a unit small enough to qualify as a “neighborhood” capable of sustaining itself, yet also capable of being aggregated into a larger system at the scale of a town. Each ward was 675 feet square and contained four blocks of “tything” or residential lots 300 ft. By 202.5 ft. and four “trust” or public lots. Each tything block contained ten 60 by 90 ft. lots which were divided in the center by an alley of 22'-6''. This arrangement left a central square capable of serving as a park, or civic square. This remarkable plan.
has survived almost intact from the colonial period because of the flexibility inherent in the dimensions of the original plan. Moreover, this inherent flexibility proved capable of accommodating an extraordinary range of future land use changes that could not possibly have been foreseen by Oglethorpe or anyone else in 1733. For example, 22'-6" is very close to a standard drive aisle (24 ft.) in a “double loaded” parking lot with 90 degree parking. Likewise, by the 20th Century the ninety foot dimension allowed for a standard retail leasing depth of 60 ft, with parking and service in the remaining thirty feet, accessible from the alley. Because the blocks were split by the alley, land uses could change in response to the vicissitudes of the market, without altering the existing use on the other half of the block. Thus, the lots facing the “civic square” could develop as institutional uses, while the remaining lots could develop as townhouses or even retail.

With the advent of the automobile, and the rationalization of the street network based on arterial, collector, and distributor streets, the larger streets between the Wards became either divided median parkways or one way pairs leading into and out of the city. The streets internal to the Wards, which were of fixed dimension, retained their civic role at the scale of the pedestrian. This maximized connectivity between the “local” or neighborhood streets (internal to the Wards) and the “global” or commuter arteries connecting the downtown to the suburbs and beyond. The original dimensional attributes of the Wards produced five connections between the local and global systems within the overall 675 ft. dimension.

Atlanta On the other hand, Atlanta was not built according to a comprehensive and unified master plan. As a terminal point of the state-owned Western and Atlantic Railroad, Atlanta (originally called Terminus) resulted from the collision of frontier trails, government subdivision into land lots, and rail lines. When the Georgia legislature annexed the Cherokee and Creek Territories in 1828, the site of the future City of Atlanta was partitioned into a grid of land lots to facilitate settlement much in the same way as the Land Ordinance. Because Georgia was one of the original English Colonies, the Land ordinance did not apply, so each land lot could be subdivided according to the will of the owner. Seventeen land lots fell within the one-mile radius of Terminus (renamed Marthasville, then renamed Atlanta, in 1845). Resistance to a unified plan by individual land lot owners led to street patterns that were aligned with the railroads, or to the existing trails (Peachtree Street) as they crossed each land lot.
The juxtaposition and collision of independent street grids and a variety of different block sizes gave Atlanta its quintessential triangular sites, shifting street orientations and distinct urban districts. The variation in block size from 200 ft. by 200 ft. in the Fairlie-Poplar District (northeast quadrant on the map) and the 400 ft. by 600 ft. Blocks in the Peachtree Center district (Northwest quadrant on the map) produced distinct urban “neighborhoods” with distinct qualities. This pattern is still very much in evidence today, interrupted only by large scale public works such as the Interstate highways that slice through the pattern to the immediate east of the downtown. This original grid of land lots and blocks made no provision for parks, civic squares, or places for monuments. It is interesting to note that when these elements of the city began to develop toward the end of the 19th century and into the 20th century, they did so at the points of collision between the rotated grids. It is as if these irregular geometries in the “plan” (if it could be called that) were converted to parks as a way of “regularizing” each distinct district into a coherent whole.
Towns of Synthesis: Salt Lake City, Portland and Seattle

Many of the Western towns are amalgams of traditions, especially benevolence and expedience. Here we consider Salt Lake City, Portland and Seattle.

Salt Lake City’s design is based on Brigham Young’s Divine vision, but bears a close resemblance to Roman principles of town planning. A Roman colonial settler was entitled to a parcel of land of two iguera in a typical centuria ‘block’ of 200 iguera; each centuria block housed 100 settlers. A centuria occupied fifty hectares (125 acres). Dividing the block equally would yield a centuria of 100 half-hectare (0.2 acre) plots. The ten-by-ten subdivision of the square centuria into half-hectare lots recalls Joseph Smith’s subdivision of the City of Zion, where square blocks 660’ (forty rods) on each side were divided into twenty half-acre lots of 66’ frontage, or ten lots per block face. The “foursquare” planning of Salt Lake City is thus modularly tied to the Roman colonia - with the exception of the rectangular lots and additional width dedicated to streets - but the City of Zion template was heavily influenced by the Ordinance Survey towns of eastern Ohio, not Rome. If the one-mile square Survey grid section is subdivided into successively smaller squares, the modular decrease in acres moves from 640, to 160, to 40, to ten acres. One section divided into sixteen squares yields the proverbial forty acres; broken into ten acre squares yields either a continuous carpet of one-acre homesteads, or subdivided in the fashion of the City of Zion, a cellular structure of one-half acre lots. At that, Salt Lake City’s overall design is characterized as one comprising large blocks.

No less benevolent and expedient are the town plans of Portland and Seattle. Both include designs for open spaces, parks, monumental squares, and government centers. They are also characterized as having small blocks, streets of similar width, and very few informal pedestrian thoroughfares. Portland’s 200-foot blocks and 50-foot lots, and Seattle’s roughly 250-foot blocks and 60-foot lots were capable of not only accommodating 19th century building typologies but also early 20th century large mercantile footprints and modern slab-tower developments, with no disruption of the block structure and preserved unity in the scale of the urban fabric based as it is on the Ordinance Survey.

Salt Lake City, Utah
1878
Cities at the turn of the last century were not pleasant places to live. The air was heavily polluted because of burning coal. Rivers and drainage ways were polluted from human and industrial waste. Streets were congested with animal-drawn vehicles and reeked of animal waste. Buildings were gray and black with soot from coal burning. People wanted to escape from cities if they could. The next best thing was to live somewhere pleasant and only commute to the city for work.

It is against this backdrop, in part, that the Garden City movement in England and later in America emerged. The Garden City, according to its fervent pioneer Ebenezer Howard, was to reinvent how people lived together through social and political equality, though not necessarily economic equality. Howard’s Garden City would be built in isolation from heavily urbanized areas; they would be, essentially, satellite towns although ideally self-sustaining economically. A significant feature of the Garden City is its separation of land uses, even among housing types. Its principle design features include industrial and commercial districts separated from one another, and residential districts composed of homogeneous housing types each housing families of particular economic classes including a special district to house industrial workers, the lowest paid workers of the day. Another significant innovation was the creation of curving streets (instead of grid or angular streets) fronting large blocks up to 750 feet on a side.

Although very few Garden Cities were ever built and none were economically self-sufficient, Howard’s ideas were embraced in America. His themes of isolating communities from urban areas, separating land uses and among housing separating housing types and densities, and crafting long curving streets fronting large blocks caught the attention of American architects and planners.

Clarence Stein perfected the Garden City template for application to American urban peri-urban (later to be known as sub-urban) areas by introducing the cul-de-sac; this introduced the idea that not only could residents be isolated from the ills of urban areas but they could be even isolated within master planned communities. Each cul-de-sac was connected to a “distributor” street, which formed a large block called a “super-block”. The distributor streets were connected in turn to “collector” streets, and those, in turn, to “Arterials”. This was the first use of these terms in subdivision platting that we are aware of.

Radburn, New Jersey, based on Stein’s template, became the American version of the Garden City.
The Great Depression brought with it first President Herbert Hoover’s and then President Roosevelt’s desire to stimulate construction of homes to launch economic recovery. Until then the federal government played virtually no role in supporting home ownership. Also, until then, to purchase a home a family would typically need to put 50% down and pay the balance within 5 years with interest. In 1933, Roosevelt convinced Congress in 1933 to authorize a newly formed Federal Housing Administration (FHA) to provide mortgage insurance to banks so they could justify issuing mortgages with just 20% down and 20 years to pay the balance with interest. However, under the scheme banks would soon run out of money to lend. In 1935, Congress created the Federal National Mortgage Association (FNMA - subsequently “Fannie Mae”) for the purpose of buying mortgage instruments issued by banks. Fannie Mae raised money to buy mortgage from wealthy investors, in insurance companies, and institutional investors. Once they sold mortgages to Fannie Mae, banks would have more money to lend. In theory, the FHA-Fannie Mae combination would grease the way out of the Depression. In practice, it did not because people simply did not have enough money to buy homes.

For the next several years during the Great Depression and into World War II, FHA developed and refined standards it used to guide its mortgage insurance program. To minimize its exposure to losses from mortgages that may be foreclosed, FHA issued rules directing banks not to issue mortgages to buyers if their homes and the lots on which they were built did not meet certain standards. FHA thus, essentially, nationalized home construction design and standards and, important of our purposes, subdivision design standards. Eager to be at the forefront of modern thinking, FHA embraced many of the Garden City ideas and American variations thereof such as separating land uses including housing types, isolating subdivisions from the urban landscape by limiting the number of access points into them, providing for long and often curved streets fronting large blocks, and allowing for loops and cul-de-sacs to further isolate small areas within subdivisions. It is no accident that local governments throughout the United States patterned their zoning and subdivision ordinances after FHA’s design standards. An unfortunate corollary to FHA during this period is its promotion of conditions, covenants and restrictions to property values within subdivisions, including the exclusion of minorities from owning homes there. By the end of World War II, these financial and design templates were to shape the next half century of development.

Another perhaps more subtle influence of FHA on shaping modern subdivision design is its development of street standards and the street hierarchy concept. The idea of a street hierarchy is to organize land uses around traffic flow. For example, arterial streets are intended to accommodate the greatest flow of local traffic (that is, not on expressways or freeways) and so intensive land uses such as offices and shopping centers would be directed to locate along them. Arterial streets are fed by collectors, collectors by minor collectors, and all collectors by local or residential access streets. FHA standards required that subdivision street systems conform to this hierarchy. To make the hierarchy work, subdivisions must have few points of access if they feed into arterial or collector streets.

Streets within subdivisions need to be constructed according to certain standards. Typical street design elements include width of travel lanes, parking lane, curbs, gutters, sidewalks, and the right-of-way to accommodate them. Unlike Traditional American subdivisions where residential streets were designed intentionally to be narrow, nowadays accommodating barely two cars traveling in opposite direction, street standards embraced by the FHA provided sufficient space to accommodate two travel lanes and at least one parking lane: resulting in minimum paved widths of 26 feet. In 1965, the Institute of Traffic Engineers (now called the Institute of Transportation Engineers) recommended minimum pavement width of 32 feet, which accommodates two 12-foot travel lanes and an 8-foot parking lane. We know of many communities where the smallest subdivision street must include two 8-foot parking lanes and two 10- to 12-foot travel lanes for a total pavement width of 36 to 40 feet. FHA standards, recommendations of professional interests, and local governments would apply one standard to all subdivisions.
Typical Street Section with 34 ft. Pavement width and two parking aisles

FLEXIBILITY

Urban areas morph or change over time. Buildings are built, wear out, and replaced over time. But the underlying network of streets carving out blocks which are subdivided into lots remains unless they undergo wholesale refabrication of the street networks. Which subdivision type is more resilient to change over time - that is, able to accommodate change with the least disruption to the underlying subdivision form? Two recent studies provide additional insights.

Arnis Siksna examined eight major American and Australian central business districts to determine whether which block dimensions and lot sizes were more adaptable to change over time than others. The four American cities selected were Portland, Seattle, Chicago, and Indianapolis. Portland and Seattle have small blocks and lots: Portland blocks are 200 feet square with lots of 50 feet by 100 feet while Seattle's blocks are 240 to 360 feet by 256 feet with lots of 60 feet by 120 feet. Chicago and Indianapolis have medium blocks and lots: Chicago's blocks are 320 feet by 378 feet with lots of 80 feet by 180 feet while Indianapolis's blocks are 420 feet square with lots of 67.5 feet by 195 feet. All American examples result in blocks that are mostly square with narrow lot fronts.

In contrast, the four Australian cities - Melbourne, Brisbane, Perth and Adelaide - had large blocks and lots, and were mostly rectangular creating large distances between blocks on their longer sides. Blocks in Melbourne and Brisbane can be considered large and their lots although narrow are quite deep: Melbourne's blocks are 600 feet by 313.50 feet with lots of 66 feet by 313.50 feet while Brisbane's blocks are 600 feet by 297 feet with lots of 66 feet by 148.50 feet. Larger still are the blocks and lots of Perth and Adelaide: Perth's blocks are 396 to 1023 feet by 369.69 feet by 396 feet with lots of 99 feet by
369.69 feet to 396 feet while Adelaide's blocks are 1487.50 feet to 1700 feet by 425 feet with lots of 212.50 feet square.

Siksna discovered that while all downtowns were able to adapt and function to change over time, the larger blocks and lots of the four Australian cases required more modification to cope with evolving connectivity pressures and building envelopes. Conversely, the small blocks of Seattle and Portland showed almost no modifications to the street network and very few informal pedestrian thoroughfares. Portland's 200-foot blocks and 50-foot lots, and Seattle's roughly 250-foot blocks and 60-foot lots were capable of not only accommodating 19th century building types but also early 20th century large mercantile footprints and modern slab-tower developments, with no disruption of the block structure and preserved unity in the scale of the urban fabric. Chicago and Indianapolis' similar performance underscores this inherent resiliency of American Traditional subdivision.

WHAT DIFFERENCE DOES SUBDIVISION DESIGN MAKE?

Does subdivision design matter? That is, is there a particular style of subdivision that is better than others? What do we mean by “better?” In particular, what particular elements of subdivision lot, block, and street pattern provides the:

1. most efficient traffic flow and least consumption of fuel?
2. least costly to taxpayers?
3. greatest return on investment?
4. best behavioral and psychological benefits?
5. most responsive to future demand?

Compared to Grid subdivisions representative of the American tradition have been found to be the most efficient in terms of traffic flow and energy consumption.

1. Access and Efficiency

This question is important because access (measured by flow) and distance (measured by fuel consumption) are at least one test of subdivision design on the urban fabric: inaccessible and inefficiently served land uses ultimately rob future generations of some measure of economic well-being. In a simulation study comparing Traditional American subdivisions with small lots and blocks to Post-War subdivisions with large lots, blocks, and cul-de-sacs, Peiser found that Traditional American subdivisions generated about 10% less internal traffic as measured by road miles and less fuel consumption.
2. **Fiscal Impact**

The infrastructure serving nearly all residential subdivisions is maintained by taxpayers. How do different subdivision types impact on cost? The question is complex because the location of subdivisions (closer or farther from urban centers) and the terrain in which they are built (flat or steep, soft soils or hard) influence costs. But if we control for those factors and consider only the subdivision type the question is simplified greatly. The Traditional American subdivision with its small blocks and small lots would seem to require more roads and with them more linear feet of water and sewer lines than the Post-War subdivision especially if it includes clustering in some areas. Logically, however, the Traditional Subdivision with its narrower though comparably deeper lots reduces frontage along roads relative to Post-War subdivisions. Although we know of no study that compares directly fiscal costs between the Traditional American and Post-War subdivision types, we are led to conclude based on costs of sprawl literature that in fact the Traditional American subdivision costs less to construct and maintain per lot than the Post-War subdivision.9

3. **Return on Investment**

Most people care about their investment in homes because homes are usually the most valuable item they own, and a source of retirement income for many. Which subdivision type promises better return on investment? Surprisingly, it would appear that Traditional American subdivisions do. Our conclusion is based on a study published by the Urban Land Institute conducted by Eppli and Tu.10 Comparing sales of single family homes within and the area immediately surrounding Traditional American subdivisions over a five year period, Eppli and Tu determined that homes in Traditional American subdivisions gained 11% more in value than homes in Post-War subdivisions.

4. **Behavioral and Psychological Benefits**

Maybe the people actually living in subdivisions do not care about access, efficiency, and return on investment. Maybe what they really respond to is emotion, measured by behavioral and psychological benefits. This is the research path taken by Brown and Cropper.11 Their study compared behavioral and psychological outcomes observed between two basic types of subdivisions: Traditional American and Post-War Subdivision.12 Traditional American subdivisions have gridded streets homes, small lots, back alleys, and, small blocks.13 Post-War subdivisions lacked these elements plus they had cul-de-sacs and lots 47% larger. Although a sample of residents in both types of subdivisions experienced about the same level of sense of community, residents of Traditional American subdivisions were more satisfied with overall subdivision design and interaction with neighbors than residents of Post-War subdivisions.

5. **Changing Preferences**

David Dowall and Elizabeth Gearin estimate that about a quarter to more than half of all households seeking homes between 2000 and 2010 will prefer more compact configurations than are available presently.14 Their estimate is based on a recent survey of housing preferences commissioned by the National Association of Home Builders. Although the range is large the implication is clear that a sizeable number of American households may prefer something other than Post War suburban residential environments. Of even greater interest, however, is among the "baby boom" households, those who are 45 years of age or more in 2000.
Taken together, the research into outcomes of different subdivision types seems to suggest that on balance that Traditional American subdivisions generate more benefits in terms of traffic reduction, energy savings (and associated air pollution reductions), taxpayer savings, homeowner property values, and social behavior and psychology than Post-War subdivisions.

So, where do we go from here?

**RECREATING THE AMERICAN TRADITIONAL SUBDIVISION TEMPLATE**

Since the end of World War II, American subdivisions have been shaped mostly by FHA standards and adaptations advanced by such professional organizations as the Urban Land Institute, Institute of Transportation Engineers, and the American Planning Association among others. The result generally is large blocks with wide lots. Indeed, the kind of small block configurations that are proven to be efficient facilitators of change and provides numerous benefits reviewed earlier are often not possible in many, perhaps most, American cities and counties. An informal survey we conducted nationally showed, for example, that current subdivision regulations allow for blocks as large as 1800 feet between rights-of-way, and many subdivision ordinances have no block size limitations at all. Although contemporary subdivision patterns are the result of a multiplicity of forces, the most striking difference between pre-regulation and post regulation subdivisions is the size of the block. In many parts of metropolitan Atlanta, Georgia, for example - the nation’s most sprawled major metropolitan area - subdivision blocks can be as large as 74.3 acres. In one area of suburban Atlanta, in north Fulton County, blocks average 99.7 acres in size. Counting rights-of-way, roughly 61 Portland city blocks, 42 Seattle city blocks, or 22.7 Chicago city blocks can fit inside one such metropolitan Atlanta block.

Block size can be calculated in a number of ways. Most subdivision ordinances calculate block size as the linear distance between intervening rights-of-way. Other ordinances regulate block size as the total perimeter length of the block. Either way, the result is an area that can be calculated in square footage, acres, or hectares. In the table below, we show the existing block sizes of a number of sites and towns across the United States, in comparison to the Fulton County, Georgia Subdivision Regulations.

<table>
<thead>
<tr>
<th>Location</th>
<th>Maximum Length</th>
<th>Square feet</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chelsea, Massachusetts</td>
<td>630 feet</td>
<td>125,000</td>
<td>2.87</td>
</tr>
<tr>
<td>Portland, Oregon</td>
<td>200 feet</td>
<td>40,000</td>
<td>0.92</td>
</tr>
<tr>
<td>Seattle, Washington</td>
<td>450 feet</td>
<td>135,000</td>
<td>3.10</td>
</tr>
<tr>
<td>Philadelphia, Pennsylvania</td>
<td>675 feet</td>
<td>303,750</td>
<td>6.97</td>
</tr>
<tr>
<td>Georgetown-Washington D.C.</td>
<td>550 feet</td>
<td>145,000</td>
<td>3.33</td>
</tr>
<tr>
<td>Manhattan, New York</td>
<td>630 feet</td>
<td>132,350</td>
<td>3.04</td>
</tr>
<tr>
<td>Savannah, Georgia</td>
<td>300 feet</td>
<td>60,750</td>
<td>1.40</td>
</tr>
<tr>
<td>Atlanta, Fairlie-Poplar District</td>
<td>200 feet</td>
<td>40,000</td>
<td>0.92</td>
</tr>
<tr>
<td>Atlanta, Peachtree Center District</td>
<td>425 feet</td>
<td>180,625</td>
<td>4.15</td>
</tr>
<tr>
<td>Atlanta, Ansley Park subdivision</td>
<td>800 feet</td>
<td>422,532</td>
<td>9.70</td>
</tr>
<tr>
<td>Fulton County Subdivision</td>
<td>1800 feet</td>
<td>3,240,000</td>
<td>74.38</td>
</tr>
</tbody>
</table>

Pre Subdivision Regulation Average Block Size (acres): 3.63 acres
Block Size Allowed Under Current Regulation (acres): 74.38 acres
The variance in block size is significant. The illustration below graphically shows the data on the table above:

- **Chelsea, Massachusetts**
  - 120,000 sf

- **Portland, Oregon**
  - 40,000 sf

- **Seattle, Washington**
  - 135,000 sf

- **Philadelphia, Pennsylvania**
  - 99,000 sf

- **Georgetown, Washington, D.C.**
  - 165,000 sf

- **Manhattan, New York**
  - 132,000 sf

- **Savannah, Georgia**
  - 60,750 sf

- **Fairlie-Poplar District, Atlanta, Georgia**
  - 40,000 sf

- **Peachtree Center District, Atlanta, Georgia**
  - 180,025 sf

- **100 Car Parking Lot**
  - 26,400 sf

- **Ansley Park Subdivision, Atlanta, Georgia**
  - 430,800 sf

- **Fulton County, Georgia**
  - Subdivision Regulations
    - 3,240,000 sf
    - (75.38 acres)

### Maximum Length of Block Side

<table>
<thead>
<tr>
<th>Location</th>
<th>Maximum Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chelsea, Massachusetts</td>
<td>600 ft</td>
</tr>
<tr>
<td>Portland, Oregon</td>
<td>200 ft</td>
</tr>
<tr>
<td>Seattle, Washington</td>
<td>450 ft</td>
</tr>
<tr>
<td>Philadelphia, Pennsylvania</td>
<td>450 ft</td>
</tr>
<tr>
<td>Georgetown, Washington, D.C.</td>
<td>590 ft</td>
</tr>
<tr>
<td>Manhattan, New York</td>
<td>600 ft</td>
</tr>
<tr>
<td>Savannah, Georgia</td>
<td>380 ft</td>
</tr>
<tr>
<td>Atlanta - Fairlie-Poplar</td>
<td>240 ft</td>
</tr>
<tr>
<td>Atlanta - Peachtree Center</td>
<td>435 ft</td>
</tr>
<tr>
<td>Atlanta - Ansley Park</td>
<td>900 ft</td>
</tr>
<tr>
<td>Atlanta - Fulton County</td>
<td>1,680 ft</td>
</tr>
</tbody>
</table>
The illustration below graphically illustrates the change in scale between and among three sites all drawn at the same scale. The two sites on the left were platted prior to the advent of subdivision regulations. The site on the right, in suburban Atlanta, was platted subject to the current subdivision regulations of Fulton County, Georgia. Average block size in Savannah is 1.4 acres, in Midtown Atlanta, 9.7 acres, and in suburban Atlanta (north Fulton County) the average block size is 99.7 acres, exceeding the regulated standard.

Savannah, Georgia, 1733-1856
Midtown Atlanta, Georgia 1890-1904
Suburban Atlanta, Georgia 1996-2002

Comparison of street configurations and block size at equivalent scales:

The map on the left shows a fully developed portion of north Fulton County, built out according to existing standards. The numbers on the map are distances in feet between intervening rights-of-way. This is the measure of block size as regulated by the Fulton County Subdivision Regulations. This pattern of street and block forces all vehicular trips, regardless of destination, to enter the global or arterial system of streets.
Prior to World War II, subdivisions were designed and developed on an ad hoc basis but were characterized typically as having small blocks and narrow lots. The height of ad hoc subdivision design and development was the period from 1890 to 1940. Such ad hoc subdivisions were designed without reference to a street hierarchy system and many thus had multiple access points to adjacent streets. Although the FHA believed it borrowed the best designs for codification into its various circulars advising communities on how to routinize subdivision practice, the effect was to standardize large blocks and, eventually, wide lots within subdivisions whose street networks conformed to a street hierarchy. We now have congested streets because of limited access points, wide paved streets serving only a few homes, large blocks that inhibit interaction and flow, wide lots that increase infrastructure cost, and generally subdivisions that are inflexible to change over time.

What can be done? Good subdivision design is an art as much as a science. We do not wish to fall into the trap of FHA, ULI, APA and others in setting forth a subdivision design template that everyone must follow. Rather, we wish to pose some general principles. They are:

**Blocks.** We begin with blocks because they are the backbone of subdivision design. Blocks can be any shape. Contrary to common belief, however, our studies indicate that square or rectangular blocks are the most flexible in the long run. If irregular, or rectangular blocks are used, the length should be no more than 1.5 times the width. (Seattle is 1.4, Savannah is 1.5, and Chicago is 1.2). They should probably be no more than 600 feet on a side (exclusive of right-of-way), though preferably smaller (Portland is 200 feet square and Seattle is 240 feet on the narrow side).

**Lots.** The 60-foot frontage lot seems to maximize development efficiencies and redevelopment flexibility. It can be aggregated easily into larger lots frontages, (90, 120, 150, etc.) and subdivided further into smaller lots. Recent experiments in neo-traditional development have shown this pattern to be resilient to the times; structures may come and go but the underlying lot pattern following this basic premise facilitates renewal efficiently. It is interesting to observe that such a lot size is comparable to the eight-rod configuration of the Roman *colonia*, a configuration intended to maximize flexibility of housing and building types over time. Seattle’s city lots are 60 feet wide (and 120 feet long) but Chicago’s 80 foot width would seem to reduce flexibility although it can allow for one home, two 40-foot bungalows, and four 20-foot townhouses. Indianapolis’s 67.50 foot width does not have much flexibility for alternative housing configurations because of its awkward width dimension. Most zoning ordinances use other aggregations: 50 to 70 to 100 foot frontages according to category. Our studies indicate that there is no rational basis for these frontages and further that in the long run, such odd dimensions inhibit flexibility.

**Street design.** Streets are socially and economically complex. They need to serve people on foot as well as in vehicles. As with good subdivision design in general, the making of a good street is as much an art as anything else. What a street should be, however, should depend on what is trying to be accomplished; a limited palette of standard designs will not fit all circumstances. The entire right-of-way must be considered as the street, not just the vehicular travel lanes. Most subdivision regulations have limited standards for sidewalks and other aspects of right-of-way design. In some cases there are no requirements for sidewalks at all. Our studies indicate that all rights-of-way should have sidewalks. Most should have street trees. Travel lanes need not be more than 10 feet to serve even large subdivision areas. Travel lanes as small as nine feet should be considered especially where blocks are small. The narrow lanes discourage speeding, are safer on pedestrians and vehicles, and provide reasonable access.
Access and Street Hierarchy. Streets and blocks interact to form the underlying pattern of any subdivision. The street terms Arterial, Collector, Distributor, and Local appeared first in Stein and Wright's plan for Radburn. In 1929, their overriding concern was separating vehicular and pedestrian traffic. This conceptual street hierarchy created the large “super-block”. We believe that this hierarchy, imbedded in all subdivision ordinances we examined has inherent weaknesses. Smaller blocks with intervening rights-of-way between 200 and 600 feet apart will do as much or more to slow traffic and accommodate pedestrians as narrow streets will. Savannah’s system of Wards can serve as an illustration of this principle. Within the Wards, one can only go 200 feet without coming to a stop. Vehicular traffic is slowed because of the stop and go conditions required by the short blocks. On the other hand, the streets between the Wards are high speed arterial roads that allow for rapid movement into and out of the city. Stop lights are placed only at the intersections of the arterial streets at approximate intervals of 1500 ft., roughly the equivalent of the 1800 ft. intervals between rights-of-way in contemporary subdivision regulations. The brilliance of such a system is that it accommodates both high speed, global traffic, and low speed, local, pedestrian friendly traffic within a single network, while maximizing the connections between the two. The principles inherent in this should be examined more closely.

Community Role. Almost all (and maybe all) subdivision ordinances are written to address every landscape with one design scheme. Although some have allowances for difficult terrain, even they usually require a variance procedure. Subdivision ordinances need to be tailored to reflect the function each part of the community is intended to serve. A special section of the subdivision ordinance should be tailored to manage new or resubdivision in historically significant areas or areas that are already built out based on American Traditional subdivision principles. It seems ludicrous to impose a minimum 600 foot block or allow an 1800 foot block, with wide streets and wide lots on a historical grid of small blocks, narrow lots, and narrow streets - yet, this is what many, if not all American communities do. Even in newly developing areas, however, we know from emerging research that large blocks, wide lots, and wide streets undermines sense of community. The preservation of existing communities and the creation of new ones must be a guiding principal of subdivision ordinances.

Conceptual Platting. In most communities there are large undeveloped, underdeveloped, or soon to be redeveloped areas. If subdivided, their development may not reflect historical precedent in the area, be sensitive to localized terrain, or isolate new development from the rest of the community. One solution is to pre-plan those areas down to the streets and blocks in a way that weaves the new development into the fabric of the community. The conceptual platting scheme could be adopted as part of the comprehensive plan and implementing ordinances so that if the new development conforms to the design its processing can be greatly streamlined.

Civic Spaces. Subdivisions before modern subdivision ordinances often had civic spaces, especially those designed to be city centers (Philadelphia and Savannah come to mind) or late-19th and early 20th Century garden suburbs such as Riverside in Chicago, or Ansley Park in Atlanta. Somehow the idea of civic and public spaces became supplanted by the idea that generic “open space” is needed instead. There is a difference. Many modern subdivision ordinances require a certain percent or amount of land to be set aside for parks, buffers, stream protection, or other environmentally sensitive needs. Such open spaces are found often at the fringes or edges of subdivisions, in the center of large “super blocks”, or set aside as a negotiating tool without concern as to its role in the formation of the community. Perhaps only very few subdivision ordinances (we know of none) require true public spaces such as formal squares, landmarks, and features of identity. The human being’s need for identity represented through public spaces has been understood for thousands of years yet modern subdivision ordinances either ignore such public spaces, or in their silence essentially preclude them.
The following three case studies are examples of different approaches to regulating development by focusing on and extending the intrinsic qualities of the town they represent. Each is the result of an integrated architecture and city planning graduate studio at Georgia Tech, and though by no means claim superiority to the many other innovative development codes active in the nation they do show the variety of approaches possible in retooling conventional zoning and subdivision regulations.

**Hahira, Georgia.** Hahira is a small town in South Central Georgia, founded in 1891 as a railroad stop for local tobacco producers. With the construction of Interstate 75 and its proximity to larger Valdosta, Hahira’s fate was written on the wall: assimilation into the larger city’s boundary as a bedroom community. Hahira’s administrators recognized this possibility as counter to the desires of the town residents, who felt strongly about preserving Hahira as a small town. To prepare for the growth surge predicted by the lifting of a development moratorium, the town commissioned Georgia Tech in 1993 to develop a new set of regulations that would address the goals and objectives of the community, limit growth to certain types and locations, and clarify and customize the regulatory format.

The development code devised by Georgia Tech includes small blocks and lots, ignored the existing State specified street hierarchy (arterial, collector, distributor, etc.). Instead, the plan sought to base the street network on empirical studies of the historic town. It also included conceptual platting of large vacant areas with the effect that developers now typically submit subdivision plans based on this platting and speed through the approval process.

![Hahira Master Plan 1996](image)

Much of the eastern half of this area is not developed. Using the existing grid from the western portion of the existing town as a model, the eastern area was platted conceptually based on the precedent of the local grid. Developers conforming to this scheme receive approvals in a matter of days.

The development code also created separate subdivision design themes based on different parts of the city. The orginal, gridded part requires future subdivision to conform to traditional principles. However, to make it nearly impossible for property owners outside the city limits to request annexation to the city (to absorb its sewer capacity but at the expense potentially of foreclosing on future development inside...
the city) the code requires that edges of the city be designed following both traditional and contemporary principles. Subdivisions with loops and lollipops surrounding the city would prevent annexations to the city in most cases but even those subdivisions need to have small blocks and lots. Separate sidewalk and landscaping schemes unique to the traditional and “suburban” parts of the city are also part of the code.

**Oxford, Mississippi.** Oxford, William Faulkner’s ‘Jefferson’, is a town of 14,000 about 1½ hours southeast of Memphis in the Mississippi hill country. It is the home of the University of Mississippi (Ole’ Miss) and is considered the capital of southern literature. The city center contains one of the most beautiful courthouse squares in the South. Its mild climate, intellectual and cultural resources, affordable real estate, and proximity to Memphis have made it a desirable target for southward migration, and particularly attractive to retirement age in-migration. The problem: how to maintain its character in the face of doubling or tripling in size in the next generation. Georgia Tech was asked to help the city meet this challenge.

We discovered a rich tapestry of small blocks, small lots, and small streets emanating from the courthouse square, yet we also saw the effect of the city’s contemporary subdivision ordinance on historic as well as newly developing areas. The idea of a street hierarchy was turned on its head in the development code that evolved from the design process. Oxford’s development code on design principles and established road and drainage corridors to guide development into certain areas but depends on the specific choice of street to control subdivision and set development limits. The diversity of existing street types found in Oxford made it possible to structure the code in this way while rooting itself in the characteristics of place. The result is three major subdivision prototypes that are applied in different parts of the city where they are applicable. The historic area is built on very small streets and alleys while the first generation suburban areas are patterned after the FHA-driven standards that shaped them with the exception that blocks remain small, and the new suburban areas combine reintroduce American Traditional subdivision design into them albeit with slight larger streets and lots than the FHA-era subdivisions.
Port Wentworth, Georgia. Port Wentworth's reason for being, the navigability of the Savannah River, is also cause of its demise. Originally a company town of the Port Wentworth Terminal Corporation, the growth of the Georgia Ports Authority docks and limited dockland available elsewhere in the state means that Port Wentworth stands directly in the path of progress. The Authority, in fact, has been slowly acquiring pieces of the city. Its future as a city is definitely in doubt. With the town's future in doubt, the city annexed 5000 acres of land in which to direct new development. As a suburb of Savannah, Port Wentworth expects to attract up to 30,000 new residents and 10,000 new jobs to this area.

With the 5000 acres being mostly vacant there was an unusual opportunity to shape its development as though it were a canvas. A marketing, planning, and design team of which Georgia Tech was a part crafted a set of conceptual plats for the area that were composed of small, rectangular blocks with lots of 64 by 128 feet. Streets and blocks were oriented about civic spaces such as school sites, formal parks, and landmarks. The commercial areas were designed similarly, including the highway commercial areas.

NEXT STEPS
In all three cases above, single-family detached housing predominates as does dependence on the automobile as the principal means of getting about. Yet, all three examples above show how American Traditional subdivision principals can be woven into the fabric of emerging suburbia. In all cases but one, merely amendments to subdivision ordinances can reintroduce American Traditional subdivisions into their communites. Before discussing the one exception, here are the simple principles in which
existing subdivision ordinances can be changed in ways that may appear innocuous but that will nonetheless have a lasting impact on communities:

1. Block size is the single most important element regulated by subdivision ordinances. Block size may be regulated in three ways: interval between rights-of-way, total perimeter, or acreage. The most common measure is "Interval Between Rights-of-way". In this case, no block should be longer than 600 feet except where specific topographic or other constraints warrant. Our studies indicate that 200 feet is the smallest interval that can be practically applied to a block side. The ideal would be something like 240 feet square or 240 feet by 480 feet but the range selected locally needs to be based on local conditions such as terrain, custom, and historic development patterns.

2. Our studies indicate that appropriate lot frontages are either aggregates or subdivisions of 60 feet. A block of sixty foot lots produces five lots for a standard 300 foot block or 10 lots for a 600 foot block. The 60 foot width also corresponds to the 60 foot street right of way, allowing flexibility for block length, the dimensions of the tract to be subdivided, locations of connecting rights-of-way on adjoining tracts, and adjustments for topographic features and site design. This lot size also provides for flexible build-out and alterations of building type and use over time. For example, a single family house two rooms wide perpendicular to the street (the typical urban house, which can be a townhouse, bungalow, four square, gabled "el", and others) is typically 30 to 40 feet wide, allowing sufficient side yards, and with the narrower house, a driveway to parking in the rear. Single family houses with two rooms wide parallel to the street would multiply to produce 90 or 120 foot lots, the typical width for current suburban houses. Lot depth is variable, depending on topography, the provision of alleys, urban locations, block configuration, and regional preferences. The minimum may be 90 feet, with service alleys producing a block dimension ranging from approximately 200 ft., up to 240 ft. or its multiple to a maximum of 480 ft. This larger dimension provides sufficient block sizes to accommodate higher density development with parking lots or decks on the interior of the block at some point in the future. This method of subdivision is simply a reformulation of traditional methods, accommodating contemporary conditions of the automobile, housing types, and housing preferences.

3. The street is the entire Right-of-way, not just the portion that one drives on. As such, street standards must include design standards for the entire right-of-way, including sidewalks, in addition to the travel and parking aisles. Sidewalk width may vary depending upon the adjoining use within a given right-of-way, but should be continuous and connected on all streets.

4. Street design and lane width within interconnected local subdivisions respond in complex ways to block dimension, number of lots, building types, access types (alley or front driveway), etc. The smallest residential street would have a pavement width of 24 feet, allowing one parking lane and two way traffic. Sometimes called a "stop street" because two cars meeting where a car is parked means that one car must stop and allow the other to pass. Certainly, this dimension could not be repeated over a large area. The typical single family subdivision street would be the standard street that was built in urban neighborhoods during the first half of the 20th Century. This street is approximately 34 feet wide allowing parking on both sides and two way traffic. This street is sometimes called a "yield street" because when two cars meet with parking on either side, one car must yield to the other; when a car is parked on one side, the two passing cars will slow to less than 5 mph when passing. Block lengths of 200 to 600 feet are typical for this street dimension. Streets that move more traffic must be wider to allow traffic to flow, but narrow enough to keep traffic calmed. However, such a street is not appropriate for a low density single family subdivision; without cars parked on the street at most times, the street encourage
excessive traffic speed. Perhaps the most appropriate way to regulate street width is to observe local conditions - the empirical evidence of the relationship of lots dimension, block dimension, and street width, instead of generic standards regulating pavement width.

5. Multiple access points are needed to weave subdivisions into the fabric of the community. Limited access points tend to increase congestion.

6. Separate subdivision templates should be considered for separate areas of the community to enhance the existing pattern of development or create a new pattern. One size does not fit all. The local templates should include different standards for street design. Streets must include sidewalks, right of way design standards, street trees, as well as travel and parking lanes.

7. Civic spaces should be required in addition to open spaces. Current regulations requiring certain percentages of “open space” do not specify how such “open space” is to be used. All too often such “public” open space is located behind the lots, or in the interior of a super-block, and includes land that could not otherwise be built on: floodplains, wetlands, etc. For public space to be truly public, it must be both visible and accessible. For open space to form the basis of a community, it must be shared by everyone. Subdivision regulations requiring open space should be amended to specify how, and where, such public open space is to be located, and should include parks, civic spaces, squares, plazas, and places for future monuments, in addition to, or in concert with, protecting natural areas.

8. Wherever possible and in due consideration of market conditions, conceptual platting should be undertaken so that both the community and the developer know in advance what is expected and acceptable. If a developer proposes to implement the conceptual plat, permitting should be expedited as a reward because, after all, the efficacy of that kind of development has already been established. But conceptual plats must be responsible to realities of the market otherwise they are a waste of valuable resources to everyone.

The lone exception to this? The underlying zoning codes dictating lot size and lot width. Since World War II lot sizes and widths have been increasing in suburban areas. Typical suburban lot sizes range from 100 feet to 200 feet of frontage. To accommodate street configurations in a cul-de-sac pattern, lot sizes may be as high as one acre, with only 35 feet of frontage required.

![Diagram of Single Family Detached Lot](image-url)

Single Family Detached Lot, 1 acre, 35 ft. frontage with 100 ft width at front yard setback.

Fulton County, Georgia
Our studies indicate that these numbers are essentially arbitrary, and further, that they contribute substantially to patterns of sprawl. To recreate American Traditional subdivisions in suburban areas, lot widths need to be reduced to multiples of 60 ft., regardless of depth. Thus, multiples of 60 can aggregate into larger units of 90, 120, 150, 180, ft. And conversely, can be subdivided further into units of 20 or 30 ft. for higher density apartments, townhouses, or retail, without altering block size or street pattern. Of course overall density will increase somewhat but if amended subdivisions ordinances include all other elements recommended, then the studies reviewed above suggest that property values will rise, taxpayer burdens will fall, and residents will have a greater sense of community.

IT'S NOT TOO LATE

In this paper we have addressed the regulatory framework, with a particular focus on the role that subdivision regulations play in the formation of urban structures over time. Because subdivision regulations control the street pattern and block size, independent of land use, their impact over the long haul is substantial, even where land use may change dramatically over time. We have pointed to changes in these regulations, and suggested that the actual metrics of block size may be the single most influential element within the regulatory framework as a whole. One may think that even if these changes are made to subdivision ordinances it is simply too late to change America’s suburbs and their subdivisions because after 50 years of Post War subdividing the figurative horse is out of the figurative barn. While this may be true in many circumstances, such as very slowly growing parts of the county, it is clearly not true elsewhere. The United States will need about 27 million housing units to meet the demands of growth between 2000 and 2025. In addition, we will lose, conservatively, about 0.5% of our existing housing stock annually, or about 13 million more homes. Combined, we will need to build 40 million new housing units. Assuming a third of those will be apartments, condominiums, cooperatives and the like, we will need to plat about 1 million lots per year to keep up with demand. A million new lots a year over a generation can bring many visible changes to the American built environment. If studies are correct in the benefits received, these changes can also raise the quality of life in America within a generation. Future generations will be how we choose to subdivide today.
The Statistical Abstract of the United States for 2002 indicates total land to be about 1.94 billion acres with about 400 million acres held by the federal government. States and local governments own an undetermined amount assumed here to be less than half that owned by the federal government.


We are simplifying greatly Howard's Garden City ideas. For a full discussion see Robert Fishman, Urban Utopias in the Twentieth Century, MIT Press (Cambridge, MA), 1982.

For a detailed account of this, please see Mel Scott, History of American City Planning, University of California Press (Berkeley), 1969.

See Kenneth Fox, Crabgrass Frontier.

(I believe that the above reference should be: Kenneth T. Jackson. Crabgrass Frontier: The Suburbanization of the United States, Oxford University Press, New York. 1985.)


This is our terminology. Brown and Cropper use New Urban Subdivision and Standard Suburban Subdivisions respectively. We prefer our terminology in the context of this report.

We infer this from their descriptive assessments.

The 1990 and 2000 censuses showed densities of urbanized land in metropolitan Atlanta to be the lowest among all metropolitan areas more than two million in population.