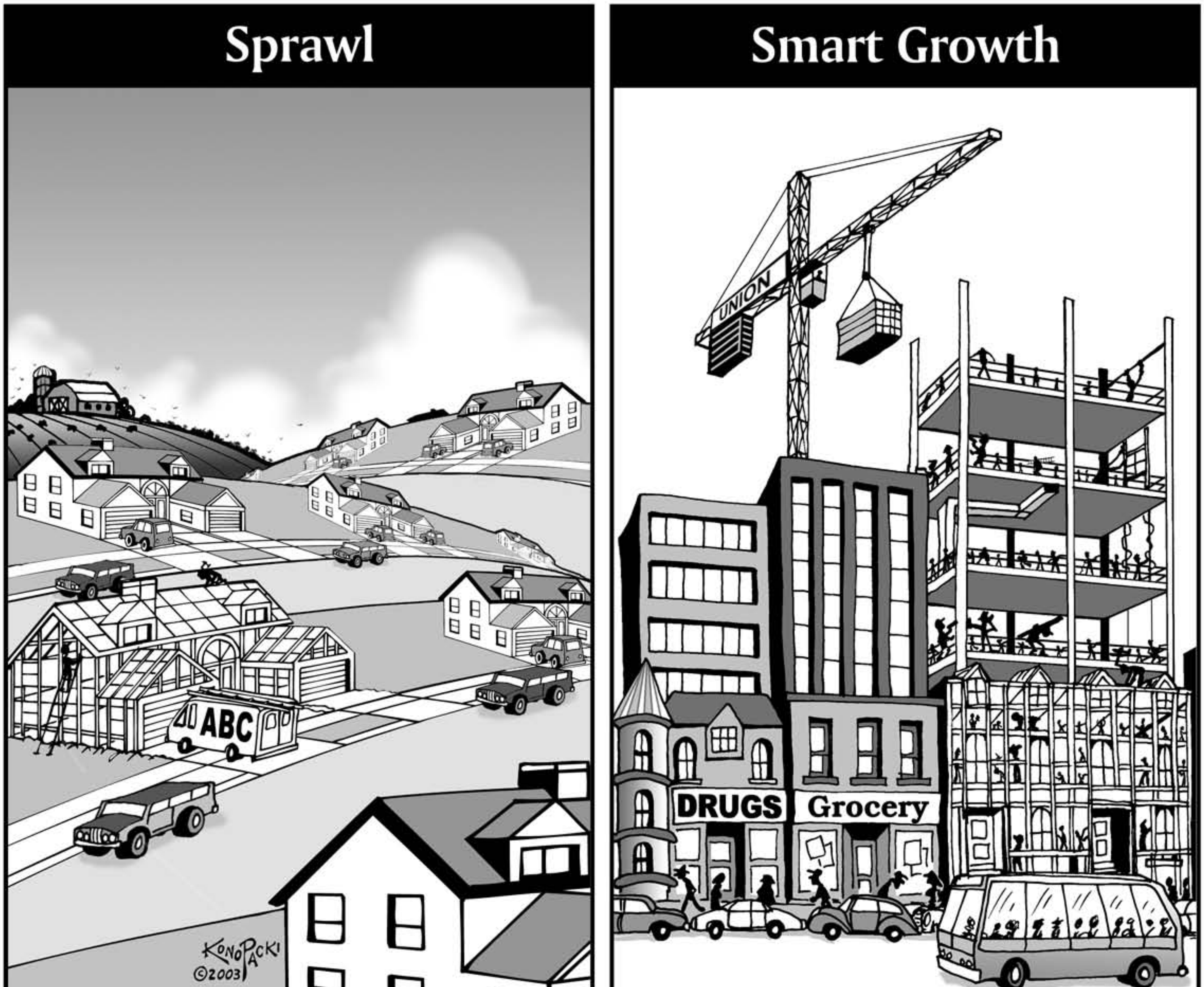
The Jobs Are Back In Town

Urban Smart Growth & Construction Employment



Good Jobs First
November 2003

The Jobs are Back in Town:

Urban Smart Growth and Construction Employment

by

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Executive Summary

"Smart growth equals no growth." This suspicion is what has kept many people in organized labor, especially in the building trades, from joining the growing movement to stop the spread of suburban sprawl.

This report, for the first time we believe, begins to provide evidence that the job-related arguments against smart growth are dead wrong. Rather than diminishing the number of construction jobs, its turns out that smart growth is in many ways better than sprawl in creating employment for workers who build residential and commercial structures as well as transportation infrastructure.

We reached this conclusion by looking at smart growth in two ways. First, we considered the urban growth boundaries that have been employed in some parts of the country as a way of stopping the spread of sprawl and its harmful effects, such as traffic jams, deteriorating air quality, shrinking farmland and characterless communities.

In looking at Oregon, which pioneered the use of such boundaries in the 1970s, we found that this policy has not undermined the construction industry in the state. Using data from the federal government's Census of Construction (which is conducted every five years), we found that in the period from 1982 to 1997 (the latter year being the most recent for which full Census results are available), Oregon far outpaced the country as a whole with regard to growth in the dollar volume of construction activity as well as construction jobs. During that 15-year period, the number of construction workers in Oregon increased 120 percent, while the rise in the United States as a whole was only 26 percent.

We reinforced this conclusion by commissioning an academically rigorous study by Prof. Arthur C. Nelson of Virginia Polytechnic University and Prof. Raymond J. Burby of the University of North Carolina. They compared the growth in construction activity in 155 metropolitan areas, which were divided into two groups—those that had adopted growth management policies and those that did not, which were dubbed "business as usual." Nelson and Burby found that the growth management group had construction activity per new resident that was more than $100,000 higher over a ten-year period than the "business as usual" group. Nearly all of the difference was attributed to building rehabilitation activities, which are a key part of the "fix it first" principles of smart growth.

Our second approach was to evaluate the relative labor intensity of different types of building projects. We found there is no data source that directly compares the urban infill, mixed-use, dense projects typical of smart growth to the outer-suburban, single-family tract housing associated with sprawl. Thanks to custom data obtained from RSMeans, a nationally recognized supplier of construction cost information, we were able to compare the labor intensity of building types more often associated with smart growth (including apartment houses and townhouses) to single family houses in general.

The results showed that the denser forms of construction had labor content that was very similar to that of single-family houses, and by some measures the smart-growth-type categories were even more labor intensive. For example, we found that labor costs represented 46 percent of the contractor's costs on a typical apartment house but only 37 percent for a typical single-family home.

We did a similar analysis with regard to different forms of highway projects, using data from the Federal Highway Administration. This showed that "fix it first" types of projects—resurfacing, rehabilitation and reconstruction of roads—are generally more labor intensive than new highway construction, after adjusting for land costs (which are necessary when building an entirely new road but are not relevant when upgrading an existing one). For instance, we found that for every $1 billion spent on federally-aided highway resurfacing projects, some 10,421 person-years of construction labor were generated, while with new highway construction (after adjusting for land costs) only 9,316 person-years were created.

Unfortunately, it is not possible to directly compare the construction job-creation impact of new highways with new mass transit projects, because of an absence of comparable data for the latter.

In the final section of the report, we put aside comparative measures and looked at the absolute amount of investment (and hence job creation) involved in a sample of large smart growth projects that are currently under way or have recently been completed across the United States. One of our prime examples is Atlantic Station, a 138-acre urban infill project at the site of a former steel mill in the Midtown section of Atlanta. The project, which is expected to involve some $2 billion in construction spending, will create some 12 million square feet of new office space, 5,000 new residences, 2 million square feet of retail and entertainment space and 11 acres of public parks. It will feature a 130-foot-wide multi-modal bridge linking the project to the rest of Midtown. A clean-fuel shuttle service will run through the project and over the bridge to connect to a MARTA subway station. In other words, smart growth hardly means small scale.

Overall, our research is certainly not the last word on a new area of inquiry, but it strongly implies that assumptions held by many about smart growth and construction jobs will have to be reconsidered.

Although this report is primarily about the total quantity of labor involved in different aspects of construction, we also took a brief look at the evidence about *union* labor. We found union density data (i.e., union members as a percentage of the workforce) for the construction industry in 18 large metropolitan areas and compared that data to measures of sprawl by urban area prepared by Smart Growth America, a non-profit research group. Putting aside a few special cases, we found that the metropolitan areas with the highest levels of construction union density are also ones with lower measures for sprawl. Four of the five metropolitan areas with the highest level of construction union density—Chicago, Milwaukee, New York City and Philadelphia—have below-average sprawl measures, while Dallas, with the lowest construction union density among the 18 areas, has a high degree of sprawl.

We conclude that smart growth is good for construction workers in general—and especially for unionized ones.

Introduction

In recent years, people in the United States have grown increasingly concerned about the impact of what was once the arcane issue of land use policy. The dispersion of new homes, workplaces, retail outlets and other facilities farther and farther into suburbia and beyond–now widely described by the pejorative term "sprawl"–has brought with it a growing chorus of complaints about punishing traffic jams, deteriorating air quality, shrinking farmland and characterless communities.

Along with the criticism has come a growing movement to check, or even reverse, sprawl. Although efforts to put geographic limits on growth began in the 1970s, it was not until the late 1990s that this movement took off, thanks in no small part to its adoption of the catchy phrase "smart growth" to describe its alternative policy prescriptions. Today, advocacy of smart growth is a standard item in the agenda of the environmental movement and has received broader acceptance as well. The Environmental Protection Agency, which embraced the concept during the Clinton Administration, has continued to promote smart growth during the Bush era. The agency bestows the National Awards for Smart Growth Achievement on state and local governments, and it funds research in the area. Even the real estate and home building industries now have to give at least the appearance that they support the concept of smart growth.

The story is more complicated when it comes to labor unions. Traditionally, unions did not concern themselves much with land use policy. These days, however, a union such as the United Food and Commercial Workers, which has long fought the spread of non-union, "big box" retail outlets (especially those built by Wal-Mart) in the suburbs, is seen as a pioneer of anti-sprawl activism. The same view is taken of unions such as the Amalgamated Transit Union and the Transport Workers Union, which have campaigned for higher levels of public spending on subways, light rail and buses. Their motivation may have been primarily to protect the jobs of their members, but to the extent that they influenced policies that took commuters out of their cars, they were promoting smart growth. In recent years, labor bodies such as the Chicago Federation of Labor and the Contra Costa County (California) Central Labor Council have been explicitly promoting smart growth policies, and in December 2001 the national AFL-CIO approved a resolution urging unions to get involved in the sprawl debate.

Not all of organized labor has rushed into the arms of the smart growth movement. This was quite apparent in 2000, when voters in Arizona and Colorado were asked to vote on growth-management ballot measures. In Colorado, the state AFL-CIO came out against Amendment 24, siding with those who argued that it would destroy jobs and raise housing prices. "We're afraid it's going to adversely affect, especially, our construction people, but not only them, everyone else," the organization's president told a reporter.[1]

At the same time, the Arizona AFL-CIO actively opposed Proposition 202, which called on cities to draw development boundaries. The state AFL-CIO was reported to have joined with the Arizona Chamber of Commerce and major banks in paying for a controversial study that concluded that Proposition 202, which was promoted by the Sierra Club and other groups, would destroy as many as 235,000 jobs in the state in the first two years.[2] (The leadership of the AFL-CIO in both Arizona and Colorado has changed since these positions were adopted.)

The reason for labor's position on Amendment 24 and Proposition 202, both of which were defeated by the voters, was primarily a fear that smart growth policies would be bad for construction workers. The study that the Arizona AFL-CIO co-sponsored, which actually spoke in terms of person-years of job loss, claimed that the vast majority of the purported employment decline would occur in construction. This was based on the authors' unsupported assumption that construction activity would, in the best-case scenario, decline by 40 percent in the first year after the growth management plan went into effect.[3]

It is understandable that labor leaders, hearing the results of such research without examining its methodology, would be alarmed at the potential impacts of smart growth policies. The question is whether claims of this sort–which amount to the idea that smart growth equals no growth–have any validity. The goal of the present study is to determine the likely impact of smart-growth policies and practices on employment in the construction sector.

Defining the Question

A major challenge to land-use research these days is the difficulty of defining terms such as sprawl and smart growth. Some have likened the problem to that of pornography: it's hard to put in words, but you recognize it when you see it. A study by Reid Ewing, Rolf Pendall and Don Chen takes a rather abstract approach in defining sprawl as "the process in which the spread of development across the landscape far outpaces population growth."[4]

For the purposes of this report, it is most important to define smart growth. Aside from simply presenting the term as the opposite of sprawl, most advocates these days do not focus on the idea of urban growth boundaries, such as those that have been in place in Oregon since the 1970s. Instead, the tendency is to emphasize the principles or outcomes of smart growth. For instance, the website of the organization Smart Growth America lists six outcomes that smart growth is meant to achieve[5]:

- Neighborhood Livability
- Better Access, Less Traffic
- Thriving Cities, Suburbs and Towns
- Shared Benefits
- Lower Costs, Lower Taxes
- Keeping Open Space Open

The website of the Smart Growth Network employs a list of ten Smart Growth Principles[6]:

- Create Range of Housing Opportunities and Choices
- Create Walkable Neighborhoods
- Encourage Community and Stakeholder Collaboration
- Foster Distinctive, Attractive Places with a Strong Sense of Place
- Make Development Decisions Predictable, Fair and Effective
- Mix Land Uses
- Preserve Open Space, Farmland, Natural Beauty and Critical Environmental Areas
- Provide A Variety of Transportation Choices
- Strengthen and Direct Development Towards Existing Communities
- Take Advantage of Compact Building Design

To make matters more complicated, some people associate smart growth with design concepts such as New Urbanism and Traditional Neighborhood Development. The charter of the Congress for the New Urbanism contains no fewer than 27 principles.

A publication of the Urban Land Institute defines smart growth in a way that avoids a laundry list but lacks specificity: "At its core, smart growth is about ensuring that neighborhoods, towns and regions accommodate growth in ways that are economically sound, environmentally responsible, and supportive of community livability–growth that enhances the quality of life."[7]

In short, there seems to be no simple and precise way to define smart growth. This, in turn, makes it difficult to evaluate the process in quantitative terms. If we are to assess the employment impact of smart growth, we need to find some way to *measure* it and compare it to what happens under business as usual.

Two Approaches to The Problem

When we began this project it appeared that no one had previously addressed the question of the construction-employment impact of smart growth policies in a systematic way. Consultation with experts and a thorough search of policy reports and academic literature in economics, urban planning and related fields failed to turn up any significant material other than the type of questionable study cited above in Arizona.

In June 2003 the U.S. Conference of Mayors released a report on the rehabilitation and redevelopment of pollution-tainted urban land known as brownfields. It included an estimate of the number of jobs (some 570,000) that could be created by such development, but this was based on responses by more than 200 city officials to a survey that did not specify a methodology for making the job projections, nor did it ask respondents to distinguish between temporary jobs during the remediation and construction phases, and permanent jobs associated with the new housing or workplaces being built.[8] Toward the end of our research, we learned that the U.S. Environmental Protection Agency is working on report that deals in a limited way with the employment impact of smart growth (see below).

Otherwise, it appeared that the construction jobs issue was being ignored by serious analysts. For example, a 600-page report called *The Costs of Sprawl - 2000*, sponsored by the Federal Transit Administration, has nothing to say about employment effects in discussing either the costs or benefits of sprawl.[9]

Essentially, we found ourselves in uncharted research territory. We ultimately came up with two main ways of addressing the problem:

- *Geographic approach*. This is based on a spatial definition of smart growth; i.e., development that occurs in urban and inner-ring suburban areas rather than in the outer-ring suburban and exurban areas that are identified with sprawl. We thus set out to determine whether it would be possible to compare construction employment growth in core urban areas to that in outer-ring areas.

- *Labor-intensity approach*. This is based less on the location of growth than on the nature of the development. It does not assume that all projects located in urban and inner-ring suburban areas automatically qualify as smart growth. Instead, it involves looking at specific types of projects and comparing the amount of construction labor they use.

Exploring the Geographic Approach

Upon closer examination, the geographic approach becomes problematic. First, there is the fact that it is difficult to distinguish between core and outer-ring areas when using existing labor-force data. In its Current Employment Statistics program, the U.S. Bureau of Labor Statistics tracks regional employment trends according to metropolitan statistical areas (MSAs), which are defined as including "a core area containing a large population nucleus, together with adjacent communities having a high degree of economic and social integration with that core."[10] In other words, urbanized and sprawling areas are lumped together into units that generally cannot be disaggregated. In a few cases—New York City, Philadelphia and Baltimore—BLS breaks out data for the principal city of the MSA, but it does not distinguish between inner-ring and outer-ring suburbs.

The BLS does have two other series that contain data at the county level, but they have other limitations. The Local Area Unemployment Statistics program, which is based on household sample surveys, has data at the county and city level, but it does not provide information by industry sector. Thus we cannot see the trends in construction. In addition, the geographic breakdown is based on the residence, not the workplace, of the respondent. This means that it is not possible to sort out those people who may be living in core areas and working in the outer-ring, or vice versa.

The Covered Employment and Wages program, which is based on employer payroll data gathered by state employment agencies, also provides statistics at the county level. The problem is that the geographic breakdown is based on the location of the employer's office. In the construction industry, work is done at job sites apart (and often far) from the headquarters. A company's office may be located downtown and have job sites in outer-ring areas, or vice versa.

All of this goes to show that labor-force data cannot effectively be used to compare construction employment trends in core and outer-ring areas. Even if the data did exist, there is little doubt that they would confirm the obvious fact that economic development in most of the United States these days is heavily concentrated outside core urban areas–that is precisely why there is growing concern about sprawl. Even without clear employment data, one only has to look at the data from the Census Bureau on geographical mobility between cities and suburbs. Despite all the talk of a back-to-the-city movement in some parts of the country, there are still many more people moving from cities to suburbs than are going in the other direction. The most recent national data, which covers the period from March 2000 to March 2001, indicate that some 2.7 million people moved from suburbs to central cities, far fewer than the 5.2 million people who moved from central cities to suburbs.[11]

Another geographical approach is to compare metropolitan areas, looking for differences based on their growth management policies. This avoids the problems in comparing the job-creation impact of smart growth to that of sprawl and instead looks at construction employment trends in areas that have adopted smart growth policies compared to those that have not.

In Chapter I we look at construction labor force data for Oregon, a pioneer in the use of urban growth boundaries, to see whether the dire predictions about construction job loss came to pass. In the course of our research, we learned that Prof. Arthur C. Nelson of Virginia Polytechnic University and Prof. Raymond J. Burby of the University of North Carolina had done a more sophisticated comparison of economic impacts under different growth-management policies. Good Jobs First commissioned a study from Professors Nelson and Burby that appears as an Appendix to this report.

Exploring the Labor-Intensity Approach

Our effort to compare the use of construction labor by smart-growth-type projects to conventional development also raised methodological complications. The major one, of course, was the difficulty of specifying what constitutes a smart-growth project. And even if one could establish a definition, it appeared that there would be no data with which to make labor intensity comparisons.

We attempted to address the problem by speaking with developers and contractors who have been involved in self-identified smart growth activity. This yielded some useful observations but little in the way of data. Developers, it turns out, pay little attention to the exact quantity of labor that goes into their projects. The industry tends to think in terms of overall costs (usually on a square foot basis), and the detailed components of those costs are left to the general contractors. Even the general contractors we spoke to said they did not keep detailed records of labor use for different projects. They also focus instead on total construction costs (including materials). Aggregate labor hours would only be available, they said, by talking to all of the subcontractors–a task that was not feasible for this project.

We subsequently learned that a company called RSMeans, a unit of Reed Construction Data, could estimate the number of hours of labor that went into the building of typical structures in various categories. The problem is that none of its categories exactly correspond with smart growth. We obtained custom data from the firm and did our best to apply it to sprawl and smart growth categories. See Chapter II for the results.

In addition to buildings, we searched for data on the use of labor in the creation of transportation infrastructure. Since one of the principles of smart growth is to encourage greater use of mass transit, we wanted to compare the labor intensity of highway construction to that of subway and light rail construction. It turns out that the Federal Highway Administration collects data on the amount of labor expended in the construction of highways receiving federal aid. Unfortunately, there is no comparable data collection done for mass transit construction. So we settled mainly for comparing the labor intensity of new highway construction to that of highway renovation and rehabilitation. For the many parts of the country without any subway or light rail systems, fixing existing roads constitutes the smart growth alternative to the sprawl-inducing construction of new ones. See Chapter III for details.

Even if it is difficult to develop precise comparisons between the labor intensity of smart growth and sprawl, we decided it would be useful to provide some indications of the magnitude of construction work these days that falls under the smart growth rubric. We did this by preparing brief profiles of some of the largest smart growth projects that are under way or recently completed in the United States. These show that, even if relative amounts remain uncertain, the absolute amount of construction labor involved in smart growth projects can be substantial.

The primary goal of this report is to examine the effects on construction labor of smart growth policies and projects. Yet because a main audience for this research will be construction unions, we also considered the question of the union density of smart growth development. As with overall employment data, it is difficult to distinguish union density levels for core urban and inner-ring suburbs from those in sprawling outer-ring and exurban areas.

We were, however, able to find construction union density figures on the Unionstat.com website for the country's 18 consolidated metropolitan statistical areas (but not for the smaller metropolitan areas because the sample sizes are too small). Here are the percentages of workers in private construction who were union members in 2002[12]:

- Boston-Worcester-Lawrence....................24.2%
- Chicago-Gary-Kenosha.............................49.5%
- Cincinnati-Hamilton.................................11.6%
- Cleveland-Akron 25.2%
- Dallas-Ft. Worth..4.2%
- Denver-Boulder.......................................14.8%
- Detroit-Ann Arbor-Flint............................31.1%
- Houston-Galveston-Brazoria.......................6.1%

- Los Angeles-Riverside-Orange 16.0%
- Miami-Ft. Lauderdale 5.7%
- Milwaukee-Racine....................................45.7%
- NYC-Northern New Jersey-Long Island......34.4%
- Philadelphia-Wilmington 30.8%
- Portland (OR)-Salem.................................22.9%
- Sacramento-Yolo 25.7%
- San Francisco-Oakland..............................29.0%
- Seattle-Tacoma-Bremerton 26.3%
- Washington-Baltimore..............................14.8%

We then compared these levels to the measures of sprawl by urban area contained in a 2002 report published by Smart Growth America. In that study metropolitan areas are ranked according to several measures of sprawl, with the average for 83 metropolitan areas put at 100. The scores for the different areas range from 14.2 (for the most sprawling area, Riverside-San Bernardino) to 177.8 (for the least sprawling, New York City).[13] Unfortunately, the study provides rankings only at the level of metropolitan statistical areas and does not combine the results into consolidated metropolitan statistical areas. This makes a direct comparison with the construction union density data difficult, but we can still look at the main components of those consolidated areas.

The two sets of data suggest a negative correlation between sprawl and construction union density; that is, the more an area is sprawling, the less its construction activity is unionized. For example, four of the five areas with the highest union density (Chicago, Milwaukee, New York City, and Philadelphia) have below-average sprawl measures. Detroit, however, has a relatively high sprawl measure and a high rate of construction union membership.

At the same time, the area with the lowest level of construction union membership, Dallas, has a high level of sprawl. Yet Miami, the second lowest in the union measure, is among the ten metropolitan areas with the least amount of sprawl, but that is partly attributable to the presence of physical barriers to growth.

Putting aside the few anomalous cases, the areas with the highest levels of construction union density tend to be ones with lower rates of sprawl. Although there are obviously many other factors to consider before concluding that there is a strict correlation–a task that is beyond the scope of this report–there is a strong suggestion that sprawl creates conditions that are not conducive to the ability of construction workers to gain union representation.

Chapter I. Do Urban Growth Boundaries Kill Construction Jobs?

By many accounts, the origins of the smart growth movement date back thirty years to the efforts by Oregon Gov. Thomas McCall, a Republican, to protect his state's farmland against encroachment by urban sprawl. During the 1970s he proposed, and the legislature approved, a requirement that all municipalities and counties in the state develop land-use and zoning plans to control further growth. These plans were to take the form of urban growth boundaries (UGBs). In 1979, following two unsuccessful ballot initiatives to have the law repealed, the state's largest city, Portland, joined with about 20 nearby municipalities in adopting a UGB and establishing the country's first elected regional government (called METRO) to administer it.

Oregon's UGBs have been the focus of a huge amount of debate about their impact on economic growth, housing affordability and environmental quality. Critics have generally argued that UGBs discourage economic development and raise housing costs to prohibitive levels. In an article titled "The Folly of 'Smart Growth,'" Randal O'Toole of the Oregon-based Thoreau Institute went so far as to argue that the "real effects [of UGBs] appear to be increases in traffic congestion, air pollution, consumer costs, taxes, and just about every other impediment to urban livability."[14]

On the other hand, Robert Liberty, former executive director of 1000 Friends of Oregon, the pioneering smart growth group founded by Tom McCall (just before he left office) and Henry Richmond, points out that UGBs in Oregon are actually pro-development in that they ease zoning rules *inside* the boundaries. Overall, however, he argues that "growth boundaries have no causal link to the level of economic activity…We've just rearranged development spatially."[15]

For our purposes, the question is what impact UGBs have had on construction jobs in Oregon. To answer this question, we looked to the most detailed source of information on construction–the U.S. Census Bureau. Twice a decade (in the years ending in 2 and 7), Census collects detailed data on construction (and other industries) in each state and in the nation as a whole. The primary categories are the number of establishments, the total dollar receipts of those firms, and the number of employees on their payrolls. Many construction firms are so small that they do not have any employees; they are contractors working largely on their own. Since our objective is to examine trends in employment, we will look only at those firms with employees.

We take the 1972 Census, which occurred just before Oregon enacted its urban growth boundary law, as our starting point, even though there was a long delay in its implementation. In that year, there were 5,951 establishments with payroll in Oregon operating primarily as general contractors or operative builders, special trade contractors, or subdividers and developers. These are the categories used by Census to define construction industries. During the year these firms had combined receipts of $1.5 billion and a combined payroll of 38,722 employees (the average over the year). Of the latter, 32,662 were defined as "construction workers" (as opposed to administrative employees).[16]

For the country as a whole in 1972, there were 437,941 construction establishments with payrolls. They had total receipts of $155.8 billion and total employment of 4,145,779–of which 3,486,592 were construction workers.[17]

We next look at the results for 1977, to see if the anticipation of urban growth boundaries had a depressing effect on construction activity. In that year the number of construction establishments with payroll in Oregon increased to 7,273, business receipts rose to $2.7 billion and the number of employees went up to 45,110, while the ranks of construction workers increased to 37,786.[18]

For the country as a whole in 1977, there were 480,014 construction establishments with payrolls. They had total receipts of $224.7 billion and total employment of 4,272,659–of which 3,565,469 were construction workers.[19]

What this indicates, first, is that construction activity in Oregon did not collapse with the enactment of the UGB law or in anticipation of its implementation. The number of construction establishments, the total receipts of those firms and the workforce of those firms all rose in absolute terms. The next question is how that growth compared with the rest of the country. In the 1972-1977 period, the receipts of construction firms with payrolls increased 77.8 percent in Oregon, while in the country as a whole the increase was only 44.2 percent. At the same time, the number of construction workers in Oregon jumped 15.7 percent compared to a paltry 2.3 percent in the United States overall. At least in the initial period, it does not appear that the enactment of the UGBs held back Oregon's construction industry. On the contrary, that industry's performance was far superior to the national average.

GROWTH IN CONSTRUCTION ACTIVITY, 1972-1977

	Oregon	United States
Total receipts	77.8%	44.2%
No. of construction workers	15.7%	2.3%

It can be argued that the real effect of UGBs would not have been felt until after the challenges were resolved, and the growth management policies actually took effect.

We thus took a look at the subsequent construction census in 1982. The following table summarizes the key results for that year[20]:

1982 Construction Census	Oregon	United States
Firms with payroll	6,075	456,701
Total receipts	$2.8 billion	$324.5 billion
No. of employees	35,551	4,275,070
No. of construction workers	28,157	3,453,239

These numbers suggest that something was wrong in Oregon's construction industry. In the 1977-1982 period its total receipts rose only 4.8 percent, compared to 44.4 percent for the United States as a whole. The number of construction workers declined some 25 percent in that period, compared to a drop of only 3.1 percent for the country overall. The likely explanation is that Oregon was particularly hard hit by the 1982-1983 recession. In 1982 its average unemployment rate was a staggering 11.5 percent, well above the national rate of 9.7 percent. Given that the entire state economy, not just construction, was in a deep slump, the decline in construction employment cannot be attributed to the existence of UGBs.

Next we examine how Oregon's construction industry performed in the period from the early 1980s to 1997, the date of the most recent construction census for which results are available. Aside from the short recession of the early 1990s, this was a time of economic growth in Oregon and the country as a whole, so it should be possible to compare the state's construction performance to the country as a whole without the distorting effects of a sharp downturn in the business cycle. Here are the key numbers for 1997[21] and the levels of growth from 1982 to 1997:

1997 Construction Census	Oregon	United States
Firms with payroll*	11,740	656,448
Value of business done**	$13.1 billion	$858.6 billion
No. of employees	80,041	5,664,853
No. of construction workers	61,957	4,332,737

* firms without employees are no longer counted by the Census Bureau
** change in terminology from Total Receipts

GROWTH IN CONSTRUCTION ACTIVITY, 1982-1997

	Oregon	United States
Total receipts/Value of Business done	364.6%	164.6%
No. of construction workers	120.0%	25.5%

These results strongly suggest that, over the long run, Oregon's UGBs have in no way impeded the expansion of construction activity and the creation of job opportunities for construction workers. Growth management policies cannot, of course, make the state immune from the business cycle–according to the Bureau of Labor Statistics, construction employment has slipped in the past couple of years in Oregon as it has nationally with the bursting of the economic "bubble" of the late 1990s–but neither do they seem to be the "job killer" that many have feared.

National Comparison: Growth Management vs. Business As Usual

We reach our conclusion concerning Oregon's UGBs on the basis of what is admittedly a simple analysis of construction activity and employment data. For a more sophisticated exercise in data analysis, we turned to Arthur C. Nelson, Professor and Director of Urban Affairs and Planning at Virginia Polytechnic University and State University, and Raymond J. Burby, Professor of City and Regional Planning at the University of North Carolina-Chapel Hill. Their analysis takes data on building permits from around the country and generates more detailed estimates of how growth management policies affect construction activity. Their study can be found in the Appendix to this report. The following is a summary of their findings.

The study has two main parts. The first raises the question of whether the presence of regional smart growth policies dampen overall development, represented by the rate of population growth. Nelson & Burby applied this question to the 35 largest metropolitan statistical areas, which were divided into those that have growth containment policies and those that do not (as well as areas with physical limits to growth). Looking at population changes from 1990 to 2000, the study concludes that the existence of a smart growth policy did not have a significant impact on the rates of population growth.

The second part of the study is more directly relevant to the topic of this report. Nelson & Burby look at the connection between smart growth policies and the volume of construction activity. To do this they examine building permit data for the period 1985-1995 for 155 metropolitan areas, which are divided into two categories—"business as usual" and "smart growth." Some 80 percent of the metropolitan areas fell into the first category, which meant that they did not have growth containment policies.

Nelson & Burby looked at the dollar volume of new construction activity per new resident for the two groups with reference to residential construction, non-residential construction and total construction. In each of the three categories, the metropolitan areas with smart growth policies came out ahead. Here is a summary of the results:

Residential construction

- Activity per new resident under business as usual: $212,481
- Activity per new resident under smart growth: $295,582
- Smart growth difference: $83,101
- Smart growth percentage advantage: 39.1%

Non-residential construction

- Activity per new resident under business as usual: $100,824
- Activity per new resident under smart growth: $112,269
- Smart growth difference: $11,445
- Smart growth percentage advantage: 11.4%

Total construction

- Activity per new resident under business as usual: $313,305
- Activity per new resident under smart growth: $407,851
- Smart growth difference: $101,979
- Smart growth percentage advantage: 30.2%

This is a remarkable result. Although Nelson & Burby include some methodological caveats, their findings indicate that metropolitan areas with growth containment policies had construction activity that was nearly a third higher than in areas that allowed growth to continue willy nilly. They go on to find that just about all of the differential in construction activity takes the form of rehabilitation rather than new structures, which is in keeping with the fix-it-first principles of smart growth.

Nelson & Burby do not directly address the question of job growth, but it is clear that areas with higher levels of construction activity, as recorded by the dollar volume of building permits, will have correspondingly higher levels of construction employment.

The EPA Approach to Measuring Smart Growth Employment

The U.S. Environmental Protection Agency will soon release a report called *The Redevelopment Sector* that looks at smart growth in a broad context.[22] EPA was kind enough to share a draft of the report and has given us permission to summarize some of its findings here. The report treats as aspects of smart growth three major activities:

- building rehabilitation (remodeling, renovation, expansion, conversions, etc. but not maintenance or minor repairs);
- infill development (development of vacant or underutilized land in existing communities); and
- brownfield redevelopment (returning abandoned, idled or underused properties, especially those that may have been contaminated by industrial pollution, to productive use).

These expansive definitions result in large dollar estimates. For the period 1990-1999, the EPA report estimates that building rehabilitation had a direct economic output in the United States of $1.84 trillion, infill development $1.22 trillion and brownfield redevelopment $380 billion. Note that under the EPA's definitions, building rehabilitation can occur anywhere in any kind of structure; infill development is any construction (new or rehab) that occurs inside the boundaries of central cities; and brownfields are mainly those projects included in state Voluntary Cleanup Programs.

While admitting that the three categories overlap, EPA estimates that in the 1990-99 period, the number of short-term jobs created (mostly in construction) were as follows:

- building rehabilitation - 1.91 million per year
- infill development - 1.36 million per year
- brownfield development - 4.42 million total for the decade (these job numbers are not annualized, because most of them occurred at the end of the decade)

These are impressive numbers. During the 1990s, the report notes, total U.S. construction employment averaged 5.7 million per year. Although the numbers above cannot be added, the implication is that a substantial portion of overall construction employment (and economic activity), perhaps 50 percent or more, can be seen as falling under the rubric of smart growth. If this is the case, then smart growth no longer comes across as a social goal, but rather as an entrenched reality. In all likelihood, the EPA estimates err on the high side, but the analysis does show that under an expansive definition of smart growth, construction employment can be seen as thriving.

Chapter II. Labor Intensity of Smart Growth vs. Conventional Development

In addition to the geographic comparisons discussed in Chapter I, we also explored the employment impact of smart growth by looking at particular kinds of construction projects. In other words, we focused on the nature of the project rather than its location. Our aim was to measure the labor intensity of smart growth projects compared to conventional ones.

This proved to be a challenging task. There is no generally accepted definition of a smart growth project apart from the idea that it is not single-family tract housing in an outer ring suburb accessible only by automobile. Many advocates of smart growth talk of concepts such as density, compactness, walkability, affordability, mixed-use, brownfield redevelopment and transit accessibility, but it is difficult to translate these concepts into easily quantifiable characteristics. It is also not clear whether all of these features are necessary for a project to qualify as smart growth; or if not, how many of them are required.

We tried to address the ambiguity by seeking architects, developers and contractors who identify themselves as doing smart growth. There turned out to be a limited number who use that term—and many of those who do so use "smart growth" simply to describe upscale apartment houses or townhouse developments that are located in urban or inner-ring suburban areas.

We did find a significant number of developers who identify with a design movement known as New Urbanism, or Traditional Neighborhood Development, that dates back to the late 1980s. Many are members of the Congress for the New Urbanism. The impact of this movement is best known in connection with planned communities such as the towns of Seaside and Celebration in Florida and Kentlands in Maryland. Communities such as these demonstrate high standards of design by architects such as Andres Duany and his Duany Plater-Zyberk firm based in Miami. We spoke with some New Urbanist developers, but we did not treat their approach as being synonymous with smart growth in our effort to measure labor intensity.

We zeroed in on developers and contractors whose projects involve compact, mixed-use developments in urbanized areas. From these individuals we got some anecdotal evidence about the labor intensity of their projects. For example, Bill Struever, president of the Baltimore-based smart growth development and construction firm Struever Bros. Eccles & Rouse, acknowledges that urban infill projects tend to cost more per unit than sprawling suburban development. "A 25-50 percent premium is not unusual," he said in an interview. Struever attributed the difference to the greater labor intensity of many infill projects, especially those involving historic rehabilitation. He also noted that political pressures to hire workers from the community tended to increase labor costs.[23]

According to Toby Millman of Eakin/Youngentob Associates, an infill developer in the Washington, DC area, "infill projects have inherently more work to do; for example, the need to tie into 200-year-old sewer mains…The projects are more complicated."[24] David Agnew of the South Carolina-based New Urbanist firm Civitas LLC, said "the homes are more expensive [than those in sprawling tract development], so there's more labor needed to do higher quality work."[25]

What these developers were unable to provide, however, was comprehensive data that would allow us to do a systematic comparison of the labor intensity of smart growth and sprawling projects. Part of the problem, it turns out, is that most developers do not pay close attention to labor costs specifically. Instead, they focus on overall construction costs (including materials) or even the broader category of development costs, which include land acquisition costs and so-called "soft costs" such as architectural fees, interest on loans and marketing expenses in addition to physical construction costs.

The developers referred us to general contractors for information on labor costs. Yet many of the general contractors we spoke to said they, too, do not collect information on labor costs and labor usage. That, they said, could only be obtained from the various subcontractors who hire most of the construction workers. We decided it was impractical to survey large numbers of subcontractors ourselves, so we continued the search for an existing data source.

Using Data from RSMeans

We then learned that there are companies that collect data, including labor content, on a wide variety of construction projects to help people in the industry perform cost estimates. The most prominent of these companies is RSMeans, a unit of Reed Construction Data. RSMeans gathers information on completed projects and analyzes it to prepare average construction cost figures for different types of residential and non-residential buildings.

Like other construction data companies, RSMeans does not use "smart growth" as one of its building categories at this time. This is not surprising, given the lack of a commonly accepted definition of the term. The best we could do was to take some of their existing categories and use them as proxies for smart growth and sprawl.

As a proxy for sprawl, we used the single-family house. As a proxy for smart growth, we used the town house, the apartment building, and the office building. These, of course, are far from perfect proxies. Single-family houses could include compact residences in urban areas, while town houses, apartment buildings and office buildings are sometimes components of sprawl. But, for the most part, single-family houses are found in sprawling suburban tracts, while apartment houses, town houses and office buildings more often are components of urban in-fill development. We also obtained data on one-story department stores, which could be a part of either suburban sprawl or downtown redevelopment. For this category, as for others, RSMeans does not distinguish between projects that take place in urban areas and those located in outer-ring suburbs.

For the various categories, we asked RSMeans to give us national averages for each building category for the following:

- Labor costs in dollars
- Hours of labor expended
- Labor costs as a percentage of direct construction costs
- Labor costs as a percentage of total contracting costs

We also asked RSMeans to break down the labor costs and hours of labor into what are known as CSI divisions. These are the 16 standard components of the building process (concrete, masonry, mechanical, electrical, etc.) as defined by the Construction Specifications Institute. We hoped to use this information to determine differences among trades with regard to the labor intensity of various types of buildings.

The following table summarizes average size and costs relating to the buildings analyzed by RSMeans, all of which initiated construction between January 2002 and Summer 2003:

Building type	Average size (in square feet)	Labor bare cost (wages & benefits)	Labor cost with markup	Construction bare cost (including materials)	Total contracting cost (incl. architectural fees and contractor overhead & profits)	Total contracting cost per square foot
Single-family house	2,006	$32,792	$51,070	$137,450	$155,727	$77.63
Town house	3,384	$50,612	$79,461	$242,150	$284,011	$83.93
Apartment building	126,400	$3,757,411	$5,899,135	$12,803,300	$16,922,400	$133.88
Office building	80,000	$1,824,955	$2,865,179	$6,881,475	$9,117,975	$113.97
One-story department store	110,000	$1,934,725	$3,037,518	$6,918,600	$9,167,100	$83.34

"Labor bare cost" refers to the actual amount paid in wages and benefits.[26] "Labor cost with markup" is the amount charged by contractors for labor, reflecting a markup of about 57 percent. "Construction bare cost" reflects the total cost to contractors, including materials. "Total contracting cost," which includes architectural fees as well as the contractor's overhead and profit, is the complete amount that would be submitted in a general contractor's bid. This would be the key number, usually expressed per square foot, considered by a developer in calculating what it cost to build the structure.

The next table shows what portion labor costs represent for the different building types.

Building type	Marked-up labor costs as a portion of construction bare cost	Marked-up labor costs as a portion of total contracting cost
Single-family house	37%	33%
Town house	40%	28%
Apartment building	46%	35%
Office building	42%	31%
One-story department store	44%	33%

What stands out, first, is that single-family houses—the type of building most commonly associated with sprawl–are the *least* labor-intensive category when it comes to labor as a share of construction bare costs. Apartment buildings, which are most commonly associated with higher-density urban environments typical of smart growth, are the *most* labor-intensive. The other categories we associate with smart growth—town houses and office buildings—are more labor-intensive than single-family homes, but less than apartment buildings. Department stores are also in the middle.

When architectural fees and contractor overhead and profit (O&P) are taken into account, the picture changes. For single-family houses, the labor portion goes down only four percentage points, which suggests that architectural fees and contractor O&P are not that significant. This likely reflects the fact that many houses are built using standard blueprints, and market competition restricts contractor profit levels. By contrast, town houses, apartment buildings and office buildings appear to involve higher architectural fees and contractor O&P, with the result that labor's share of costs drops to a level comparable to that of single-family houses. In the case of town houses, the fall is even greater.

Taken together, these numbers suggest that smart growth is not the kind of construction job killer that some critics have claimed. Measured by labor as a share of construction costs, smart growth appears to be just as labor-intensive–and in some respects more labor intensive–than sprawling development.

Looking at CSI Divisions

Until now we have been speaking of total construction labor costs. We also asked RSMeans to break down both labor costs and labor hours for each of the building categories to show the amounts of different functions that enter into the mix. Although the CSI divisions do not directly translate into the various building trades, this breakdown can give us a general idea of how the demand for different crafts varies according to building type. The following tables show the labor bare costs for each building type broken down by CSI divisions:

SINGLE-FAMILY HOUSE	Labor bare costs	Percent of total	Labor hours	Percent of total
Division 1 – General requirements (administration)	-		-	
Division 2 – Site construction (excavation, drainage, etc.)	$1,067	3.3	58	3.8
Division 3 – Concrete	$1,024	3.1	50	3.3
Division 4 – Masonry	$1,680	5.1	85	5.6
Division 5 – Metals (structural framing, etc.)	-	-	-	-
Division 6 – Wood and Plastic	$8,806	26.9	398	26.1
Division 7 – Thermal and moisture protection	$3,302	10.1	140	9.2
Division 8 – Doors and windows	$2,033	6.2	92	6.0
Division 9 – Finishes (plaster, tiles, ceiling, flooring, paint)	$10,386	31.7	496	32.6
Division 10 – Specialties	-	-	-	-
Division 11 – Equipment	-	-	-	-
Division 12 – Furnishings	-	-	-	-
Division 13 – Special construction	-	-	-	-
Division 14 – Conveying systems (elevators, etc.)	-	-	-	-
Division 15 – Mechanical (plumbing, HVAC, etc.)	$2,841	8.7	124	8.1
Division 16 – Electrical	$1,923	5.7	79	5.2
TOTAL	$32,792	100.0	1,522	100.0

TOWN HOUSE	Labor bare costs	Percent of total	Labor hours	Percent of total
Division 1 – General requirements (administration)	-	-	-	-
Division 2 – Site construction (excavation, drainage, etc.)	$1,853	3.7	101	4.2
Division 3 – Concrete	$1,520	3.0	89	3.7
Division 4 – Masonry	$2,756	5.4	161	6.8
Division 5 – Metals (structural framing, etc.)	-	-	-	-
Division 6 – Wood and Plastic	$11,612	22.9	505	21.2
Division 7 – Thermal and moisture protection	$4,316	8.5	199	8.4
Division 8 – Doors and windows	$2,626	5.2	119	5.0
Division 9 – Finishes (plaster, tiles, ceiling, flooring, paint)	$16,360	32.3	782	32.8
Division 10 – Specialties	$1,300	2.6	71	3.0
Division 11 – Equipment	-	-	-	-
Division 12 – Furnishings	-	-	-	-
Division 13 – Special construction	-	-	-	-
Division 14 – Conveying systems (elevators, etc.)	-	-	-	-
Division 15 – Mechanical (plumbing, HVAC, etc.)	$4,931	9.7	216	9.1
Division 16 – Electrical	$3,338	6.6	138	5.8
TOTAL	$50,612	100.0	2,381	100.0

APARTMENT BUILDING	Labor bare costs	Percent of total	Labor hours	Percent of total
Division 1 – General requirements (administration)	$16,900	0.4	485	0.4
Division 2 – Site construction (excavation, drainage, etc.)	$16,398	0.4	592	0.5
Division 3 – Concrete	$340,478	9.1	10,868	9.7
Division 4 – Masonry	$154,150	4.1	5,257	4.5
Division 5 – Metals (structural framing, etc.)	$183,375	4.9	5,075	4.5
Division 6 – Wood and Plastic	$23,235	0.6	735	0.7
Division 7 – Thermal and moisture protection	$67,074	1.8	2,448	2.2
Division 8 – Doors and windows	$216,982	5.8	6,771	6.0
Division 9 – Finishes (plaster, tiles, ceiling, flooring, paint)	$898,250	23.9	29,772	26.5
Division 10 – Specialties	-	-	-	-
Division 11 – Equipment	-	-	-	-
Division 12 – Furnishings	-	-	-	-
Division 13 – Special construction	$28,744	0.8	784	0.7
Division 14 – Conveying systems (elevators, etc.)	$274,199	7.3	7,077	6.3
Division 15 – Mechanical (plumbing, HVAC, etc.)	$1,076,050	28.6	30,710	27.3
Division 16 – Electrical	$461,576	12.3	12,271	10.9
TOTAL	$3,757,411	100.0	112,360	100.0

OFFICE BUILDING	Labor bare costs	Percent of total	Labor hours	Percent of total
Division 1 – General requirements (administration)	$5,268	0.3	151	0.3
Division 2 – Site construction (excavation, drainage, etc.)	$13,903	0.8	506	1.0
Division 3 – Concrete	$257,613	14.1	8,294	15.7
Division 4 – Masonry	$137,346	7.5	4,988	9.4
Division 5 – Metals (structural framing, etc.)	$97,400	5.3	2,717	5.1
Division 6 – Wood and Plastic	$13,012	0.7	411	0.8
Division 7 – Thermal and moisture protection	$46,579	2.6	1,700	3.2
Division 8 – Doors and windows	$54,191	3.0	1,590	3.0
Division 9 – Finishes (plaster, tiles, ceiling, flooring, paint)	$275,382	15.1	9,048	17.1
Division 10 – Specialties	$8,075	0.4	256	0.5
Division 11 – Equipment	-	-	-	-
Division 12 – Furnishings	-	-	-	-
Division 13 – Special construction	$6,135	0.3	165	0.3
Division 14 – Conveying systems (elevators, etc.)	$221,630	12.1	5,714	10.8
Division 15 – Mechanical (plumbing, HVAC, etc.)	$324,748	17.8	7,680	14.5
Division 16 – Electrical	$363,613	19.9	9,665	18.3
TOTAL	$1,824,955	100.0	52,885	100.0

ONE-STORY DEPARTMENT STORE	Labor bare costs	Percent of total	Labor hours	Percent of total
Division 1 – General requirements (administration)	-	-	-	-
Division 2 – Site construction (excavation, drainage, etc.)	$36,883	1.9	1,320	2.1
Division 3 – Concrete	$283,988	14.7	9,007	14.6
Division 4 – Masonry	$155,445	8.0	5,299	8.6
Division 5 – Metals (structural framing, etc.)	$90,409	4.7	2,522	4.1
Division 6 – Wood and Plastic	$11,971	0.6	378	0.6
Division 7 – Thermal and moisture protection	$126,790	6.6	4,631	7.5
Division 8 – Doors and windows	$40,459	2.1	1,294	2.1
Division 9 – Finishes (plaster, tiles, ceiling, flooring, paint)	$522,003	27.0	18,693	30.3
Division 10 – Specialties	-	-	-	-
Division 11 – Equipment	-	-	-	-
Division 12 – Furnishings	-	-	-	-
Division 13 – Special construction	$14,153	0.7	380	0.6
Division 14 – Conveying systems (elevators, etc.)	-	-	-	-
Division 15 – Mechanical (plumbing, HVAC, etc.)	$310,695	16.1	9,148	14.8
Division 16 – Electrical	$341,929	17.7	9,085	14.7
TOTAL	$1,934,725	100.0	61,757	100.0

To make comparisons easier, we have summarized the percentage breakdowns by CSI division for the five building types in one table based on labor bare costs and in a second table based on labor hours. We've eliminated the less significant CSI divisions, including Division 1, because in some categories administrative costs are calculated as part of that division and in other categories they appear separately as part of the contractor's overhead.

PERCENTAGE BREAKDOWN BY CSI DIVISION BASED ON LABOR BARE COSTS	Single-Family House	Town House	Apt. Bldg.	Office Bldg.	Dept. Store
Division 2 – Site construction (excavation, drainage)	3.3	3.7	0.4	0.8	1.9
Division 3 – Concrete	3.1	3.0	9.1	14.1	14.7
Division 4 – Masonry	5.1	5.4	4.1	7.5	8.0
Division 5 – Metals (structural framing, etc.)	-	-	4.9	5.3	4.7
Division 6 – Wood and Plastic	26.9	22.9	0.6	0.7	0.6
Division 7 – Thermal and moisture protection	10.1	8.5	1.8	2.6	6.6
Division 8 – Doors and windows	6.2	5.2	5.8	3.0	2.1
Division 9 – Finishes (plaster, ceiling, flooring, paint)	31.7	32.3	23.9	15.1	27.0
Division 14 – Conveying systems (elevators, etc.)	-	-	7.3	12.1	-
Division 15 – Mechanical (plumbing, HVAC, etc.)	8.7	9.7	28.6	17.8	16.1
Division 16 – Electrical	5.7	6.6	12.3	19.9	17.7

PERCENTAGE BREAKDOWN BY CSI DIVISION BASED ON LABOR HOURS	Single-Family House	Town House	Apt. Bldg.	Office Bldg.	Dept. Store
Division 2 – Site construction (excavation, drainage)	3.8	4.2	0.5	1.0	2.1
Division 3 – Concrete	3.3	3.7	9.7	15.7	14.6
Division 4 – Masonry	5.6	6.8	4.5	9.4	8.6
Division 5 – Metals (structural framing, etc.)	-	-	4.5	5.1	4.1
Division 6 – Wood and Plastic	26.1	21.2	0.7	0.8	0.6
Division 7 – Thermal and moisture protection	9.2	8.4	2.2	3.2	7.5
Division 8 – Doors and windows	6.0	5.0	6.0	3.0	2.1
Division 9 – Finishes (plaster, ceiling, flooring, paint)	32.6	32.8	26.5	17.1	30.3
Division 14 – Conveying systems (elevators, etc.)	-	-	6.3	10.8	-
Division 15 – Mechanical (plumbing, HVAC, etc.)	8.1	9.1	27.3	14.5	14.8
Division 16 – Electrical	5.2	5.8	10.9	18.3	14.7

These tables show that there is not a big difference between single-family houses and town houses when it comes to the relative size of the various construction functions, except perhaps in the case of Wood & Plastic. The lower percentage for town houses presumably reflects the reduced amount of framing required when residences are built adjoining one another, but RSMeans says it is also because town houses tend to use higher quality (and thus more expensive) material than the average single-family house.

The more significant differences are seen between single-family houses and larger structures such as apartment buildings and office buildings. The latter substitute steel for wood in the framing. Office buildings, in particular, make greater use of concrete in their superstructure. Apartment and office buildings involve substantially larger portions of mechanical work such as plumbing and electrical work, while thermal and moisture protection becomes a much less significant portion, as do finishes in office buildings.

The following tables compare the percentage breakdown for our sprawl proxy (single-family houses) to the average of the three building types we are using as a smart growth proxy (town houses, apartment buildings and office buildings). We present this both in terms of labor bare costs and labor hours.

PERCENTAGE BREAKDOWN BY CSI DIVISION BASED ON LABOR BARE COSTS	Sprawl proxy (single-family house)	Smart growth proxy (avg. of town house, apt. bldg. & office bldg)
Division 2 – Site construction (excavation, drainage)	3.3	1.6
Division 3 – Concrete	3.1	8.7
Division 4 – Masonry	5.1	5.7
Division 5 – Metals (structural framing, etc.)	-	3.4
Division 6 – Wood and Plastic	26.9	8.1
Division 7 – Thermal and moisture protection	10.1	4.3
Division 8 – Doors and windows	6.2	4.7
Division 9 – Finishes (plaster, ceiling, flooring, paint)	31.7	23.8
Division 14 – Conveying systems (elevators, etc.)	-	6.5
Division 15 – Mechanical (plumbing, HVAC, etc.)	8.7	18.7
Division 16 – Electrical	5.7	12.9

PERCENTAGE BREAKDOWN BY CSI DIVISION BASED ON LABOR HOURS	Sprawl proxy (single-family house)	Smart growth proxy (avg. of town house, apt. bldg & office bldg.)
Division 2 – Site construction (excavation, drainage)	3.8	1.9
Division 3 – Concrete	3.3	9.7
Division 4 – Masonry	5.6	6.9
Division 5 – Metals (structural framing, etc.)	-	3.2
Division 6 – Wood and Plastic	26.1	7.6
Division 7 – Thermal and moisture protection	9.2	4.6
Division 8 – Doors and windows	6.0	4.7
Division 9 – Finishes (plaster, ceiling, flooring, paint)	32.6	25.5
Division 14 – Conveying systems (elevators, etc.)	-	5.7
Division 15 – Mechanical (plumbing, HVAC, etc.)	8.1	17.0
Division 16 – Electrical	5.2	11.7

These table allow us to summarize which construction trades are more prevalent in smart growth building types. The biggest “winners” from smart growth are the following:

- Plumbing and other mechanical work
- Electrical work
- Elevator work

- Concrete work
- Metal structural work

The main trades that appear to decline in relative importance under smart growth are:

- Wood framing work
- Plastering, flooring and painting
- Thermal and moisture protection work
- Door and window work

It should be kept in mind, as shown earlier, that smart growth types of construction tend to be more labor intensive overall (especially when labor bare costs are analyzed), so that most trades should benefit. It's simply that some may increase substantially more than others.

Chapter III. Construction Labor Intensity of Transportation Infrastructure

Smart growth is not only about housing and commercial construction. It also involves changes in transportation priorities. Clogged roads, long commutes and the resulting decline in air quality occur when sprawling development spreads beyond public transportation lines. Smart growth envisages development that gives commuters a choice about how to get to work.

It is a fact of life, however, that in much of the United States there is little public transit (apart from buses) to speak of. Only a few metropolitan areas have subway systems of any significance, and light rail, while growing, is still at an early stage of development. In the 2000 Census, only 4.7 percent of commuters reported using public transportation.[27]

For these reasons, smart growth advocates go beyond the transit vs. highway debate and also argue for changing the way that highway funds are spent. Given that new highways tend to exacerbate traffic congestion (and thus air quality) rather than alleviate it, the upgrade of existing roads is often a better alternative. "Fix it first" is a basic principle of smart growth, not only with regard to transportation but also other forms of public infrastructure.

As part of our goal of assessing the impact of smart growth policies on construction employment, we searched for data on the labor intensity of highway construction versus transit construction, and new highway construction versus highway rehabilitation.

There is a fair amount of research on the employment impact of highway construction, which has long been regarded as a key form of economic stimulus and job creation. For example, a 1993 report by the Congressional Research Service found:

> Construction of new highways affects industries accounting for more than 80 percent of the U.S. economy. Directly or indirectly, about 350 sectors of the economy—out of 430 defined sectors—produce goods and services as inputs to new highway construction. For every dollar spent building new highways, output in the economy is estimated to rise by about $2.43.[28]

In this report we focus only on the direct employment impact, i.e. the construction jobs created while the highway is being built, rather than the ripple-effect jobs created as a result of any expanded economic activity.

The CRS report, using estimates prepared by the economic forecasting firm then known as DRI/McGraw-Hill, said that for every $1 billion of new highway construction spending, 10,640 construction jobs are created in a given year–an amount that would no longer apply, given the impact of a decade of inflation. The study did not estimate job creation for highway rehabilitation projects.

Similar work on the direct employment impact of highway construction has been performed by the consulting firm Apogee Research for the Federal Highway Administration (FHwA). In a 1995 report Apogee made use of data derived from Form 47 filings by contractors on more than 4,000 federally-aided highway and bridge projects that were under way in the period from 1989 to 1992.[29] Form 47, a mandatory reporting requirement for such projects with construction costs of $1 million or more, lists the amount of labor (and materials) used each year. Apogee also matched the Form 47 filings with the FHwA's Fiscal Management Information System. All this information went into the creation of an economic model.

Apogee used the resulting model to calculate job generation rates–the number of direct full-time jobs (defined as 1,600 hours a year) created by each $1 million in spending. The overall rate was found to be about 8.35 jobs per $1 million. Urban projects had a rate of 8.43, slightly higher than the rate of 8.28 for rural projects.[30]

What is more useful is Apogee's breakdown of job generation rates according to the type of highway or bridge project, which allows for comparisons between completely new construction and rehabilitation projects. Here are Apogee's results[31]:

National Average Job Generation Rates (full-time jobs per $1 million in spending)

Improvement Type	Rural	Urban	Average
1 - New Construction	9.42	9.51	9.47
2 - Relocation (new road replacing an existing route)	8.69	8.57	8.65
3 - Reconstruction (replacement of old pavement)	8.91	8.83	8.87
4 - Major Widening (addition of lanes)	9.87	9.07	9.40
5 - Minor Widening (widening lanes or shoulders)	8.98	8.11	8.56
6 - Restoration and Rehabilitation	7.26	7.41	7.30
7 - Resurfacing	6.47	6.34	6.44
8 - New Bridge	8.37	8.47	8.44
9 - Bridge Replacement	9.24	8.08	8.69
10 - Major Bridge Rehabilitation	10.27	9.18	9.63
11 - Minor Bridge Rehabilitation	9.86	9.34	9.51
12 - Safety/Traffic Operations	7.42	7.18	7.29
13 - Environmentally Related (e.g. noise barriers)	7.53	8.88	8.21

Taking the results of the Apogee study and updating them through 2000, the FHwA created an economic model called JOBMOD with the help of the Boston University Center for Transportation Studies and the Battelle Memorial Institute. We obtained a copy of the model on CD-ROM from Arthur Jacoby of the FHwA's Office of Transportation Policy Studies. Using it, we calculated what the model calls "person-years of first round employment generated in the construction sector." In other words, this is the average number of full-time equivalent construction jobs created by different kinds of highway projects receiving federal aid. Note that FHwA has made some revisions to the list of improvement types. In each calculation we assumed that 100 percent of the federal aid went to a single improvement type and that there were no state matching funds. Also note that it is not possible to break down the employment results by construction trade.

Person-Years of Construction Employment Generated by $1 billion in spending

Improvement Type	Labor
1 - New Route	10,351.34
2 - Relocation (new road replacing an existing route)	10,233.73
3 - omitted and replaced with new 15 & 16	-
4 - Major Widening (addition of lanes using existing pavement)	10,791.29
5 - Minor Widening (widening lanes or shoulders)	8,817.55
6 - Restoration and Rehabilitation	8,737.69
7 - Resurfacing	10,421.71
8 - New Bridge Construction & Special Bridge Projects	11,106.30
9 - Bridge Replacement	10,107.43
10 - Bridge Rehabilitation	10,089.69
11 - Minor Bridge Rehabilitation	10,533.16
12 - Safety/Traffic Operations	9,940.42
13 - Environment-Related (e.g. noise barriers, beautification)	12,651.55
14 - not used	-
15 - Highway reconstruction with added capacity	8,637.92
16 - Highway reconstruction with no added capacity	9,404.06

These results by themselves do not seem to bolster the case that smart growth practices are more labor intensive. Restoration/rehabilitation, which would probably be considered the best "fix it" option, is less labor intensive than new road construction. Major widening, which environmentalists probably regard as being as undesirable as new roads, is even more labor intensive than new highway construction. On the other hand, resurfacing, which might also be considered a smart growth option, is *more* labor intensive than new construction. It is interesting that "environment-related" projects are the most labor intensive of all, but because the category seems to include many cosmetic changes, we did not include it in our analysis.

If we average the three smart-growth-friendly improvement types (restoration/ rehabilitation, resurfacing and reconstruction with no added capacity), we end up with 9,521.15 person years.

If we average the four sprawl-oriented improvement types (new route, relocation, major widening and reconstruction with added capacity), we end up with 10,003.57 person years. This apparently indicates that sprawl-oriented highway projects are about 5 percent more labor intensive, but there is another consideration to take into account.

The Land Factor

Highway spending involves costs other than labor, of course, so a true comparison between new highways and rehabilitated ones cannot look at labor hours alone. An important difference between the two kinds of projects is that a substantial part of any budget for a new road or a major widening will be taken up in the cost of acquiring the land. That expense is not present when an existing road is being improved, meaning that a larger portion of the money can go for construction, including labor.

Although right-of-way acquisition costs are not included in the Form 47 data collection system, this information is collected by David Walterscheid in the FHwA's Office of Real Estate. A spreadsheet we obtained from Walterscheid shows that in 2002 a total of $1.2 billion (or $1,196,614,611 to be precise) was spent by all levels of government for right-of-way acquisition on federal-aid highway projects. Unfortunately, Walterscheid cannot break down this amount by the type of project, but he agreed that very little of the total would come from restoration and rehabilitation projects.

In order to calculate a percentage of highway spending for land costs, we consulted the *Highway Statistics* series issued by FHwA. This shows that in 2001 (the most recent data available), states spent $42.3 billion in capital outlays for federal-aid highways (including the amount received from the federal government).[32]

In order to estimate how much of this was for projects involving right-of-way acquisition, we consulted another section of *Highway Statistics* that provides a breakdown of the use of federal highway funds (for new start projects authorized in 2001) according to the improvement types discussed above[33]:

Distribution of Federal Funds by Type for Projects Begun in 2001

- New construction $1,272,765,000
- Relocation $172,270,000
- Major widening $1,435,672,000
- Minor widening $330,284,000
- Restoration and rehabilitation $1,903,234,000
- Resurfacing $2,609,858,000
- New bridge construction $407,376,000
- Bridge replacement $1,916,079,000
- Major bridge rehabilitation $615,623,000
- Minor bridge rehabilitation $275,407,000
- Safety/Traffic Operations $2,527,489,000
- Environmentally related $694,187,000
- Highway reconstruction with added capacity $1,228,077,000
- Highway reconstruction with no added capacity $1,714,367,000
- Other $711,005,000
- TOTAL $17,813,693,000

The categories likely to involve significant right-of-way acquisition costs (new construction, relocation, major widening, reconstruction with added capacity and new bridge construction), total about $4.5 billion, or about 25 percent of overall spending.

Given that this spending refers only to new projects, it is preferable to go back to the $42.3 billion figure for total capital outlays on federal-aid highways. Applying the 25 percent ratio to that produces an estimate of about $10.6 billion of total highway spending for projects involving significant right-of-way acquisition costs.

We can then apply the $1.2 billion figure for total right-of-way costs and conclude that land represents about 11.3 percent of spending for projects involving new routes, relocation, major widening, reconstruction with added capacity and new bridge construction. Given that some of the other improvement types may also involve some limited land acquisition costs, to be conservative we will lower the estimate to 10 percent.

This means that for every $1 billion spent on highway projects that can be considered aspects of sprawl, roughly $100 million goes for land acquisition.

If we then go back to the FHwA labor data and ignore other variables, we can revise our calculations to reflect our estimate that 10 percent of spending goes to land costs. This means that, to get at the jobs numbers most accurately, $1 billion in spending on fix-it projects such as restoration and resurfacing should be compared to $900 million in spending on sprawl-oriented projects such as new roads and widenings. The following table recalculates the construction employment generated by each of the improvement types after making this adjustment.

Person-Years of Construction Employment Generated by $1 billion in spending (factoring in land costs)

Improvement Type	Labor
1 - New Route	9,316.21
2 - Relocation (new road replacing an existing route)	9,210.36
3 - omitted and replaced with new 15 & 16	-
4 - Major Widening (addition of lanes using existing pavement)	9,712.16
5 - Minor Widening (widening lanes or shoulders)	8,817.55
6 - Restoration and Rehabilitation	8,737.69
7 - Resurfacing	10,421.71
8 - New Bridge Construction & Special Bridge Projects	9,995.67
9 - Bridge Replacement	10,107.43
10 - Bridge Rehabilitation	10,089.69
11 - Minor Bridge Rehabilitation	10,533.16
12 - Safety/Traffic Operations	9,940.42
13 - Environment-Related (e.g. noise barriers, beautification)	12,651.55
14 - not used	-
15 - Highway reconstruction with added capacity	7,774.13
16 - Highway reconstruction with no added capacity	9,404.06

If we return to the four sprawl-oriented highway improvement types (new route, relocation, major widening and reconstruction with added capacity) and do a weighted average of their labor hours, we end up with 8,989 person-years. This amount, which factors in land costs, is significantly lower than the average of 9,626 person years for the weighted average of the three smart-growth-friendly improvement types (restoration/rehabilitation, resurfacing and reconstruction with no added capacity), which do not involve land costs.* The fix-it-first options generate about 7 percent more work than the sprawl options.

In other words, once land costs are factored in, the job-generation advantage swings from sprawl-oriented to smart-growth-friendly types of highway spending.

* The weighted averages were calculated according to the figures given above on the distribution of new project spending according to improvement type.

Transit vs. Highways

As noted above, it is not possible to do the same kind of comparison with regard to the labor intensity of highway construction and mass transit construction, given that the federal government does not collect detailed labor data on the latter.

The estimates of transit job creation that exist come, instead, from economic-impact models. This is the case, for example, of estimates produced by the American Road & Transportation Builders Association[34] and by Cambridge Systematics for the American Public Transportation Association.[35] We are reluctant to cite these results and compare them to the highway numbers, because the two data sets are "apples and oranges." In addition to the fact that they do not have the same empirical basis as the highway data, the transit calculations typically include non-construction costs such as transit vehicles.

Our conclusion is that it is not now possible to compare the construction labor intensity of transit and highways. Congress and the Federal Transit Administration should take steps to address this information gap. Any valid comparison of the overall job-creation impact of the two kinds of investment also needs to take into account the large number of operating and maintenance jobs created by mass transit.

Local Road Spending

Up to this point, we have been looking at the employment impacts of major highway projects (and major transit ones). Yet sprawl and smart growth also involve different policies with regard to spending on local roads. To the extent that smart growth represents growth boundaries and other means of focusing growth within a more limited geographic area, it seems obvious that there will be a reduced need for spending on new roads.

The extent of this difference was quantified by Robert W. Burchell and others in their comprehensive study called *Costs of Sprawl-2000*. They estimated that under a controlled growth scenario, spending on local roads in the period from 2000-2025 would be $817 billion, which represents a savings of $110 billion, or 12 percent, over the estimated cost of $927 billion under an uncontrolled growth scenario. The savings stems from a reduction of 188,000 in anticipated new lane-miles.[36]

From a fiscal point of view, this savings in road costs represents a distinct advantage for state and local governments. From a construction employment point of view, it implies less demand for labor under the smart growth scenario–unless, of course, all of the savings went into the construction of new transit systems, the improvement of existing roads, school renovation or other capital projects.

Chapter IV. Profiles of Major Smart Growth Projects

Up to this point we looked at quantitative evidence on the relative labor intensity of smart growth and sprawling forms of construction. In this last chapter we provide examples of large smart growth projects. The details of these projects show that smart growth does not necessarily mean small-scale. Substantial sums of money are being spent on these projects–and they are creating lots of construction (as well as permanent) jobs.

Note that our decision to include a project here does not mean that we are giving it any kind of seal of approval. Some of these projects do not involve affordable housing, are not completely transit-accessible and/or are not being built union. These snapshots are meant to serve only as examples of job creation under a broad definition of smart growth.

Atlantic Station, Atlanta

Among urban infill projects, Atlantic Station is virtually in a class by itself. The 138-acre redevelopment and reclamation project on the site of the former Atlantic Steel Mill in the Midtown section of Atlanta is expected to involve some $2 billion in construction expenditures. It will create up to 12 million square feet of office space, 2 million square feet of retail and entertainment space, three hotels with a total of 1,000 rooms, 11 acres of public parks and up to 5,000 apartment, townhouse and single-family residences for a variety of income levels.

The developer for the project is Jacoby Development Inc., operating through an entity called Atlantic Station LLC. Jacoby, ironically, made its name developing Wal-Marts and other big-box shopping centers throughout the southeast. The company, which purchased the Atlantic Station property in 1997, now promotes environmental values and smart growth.

Atlantic Station is a prime example of environmental remediation. In fact, it is the largest urban brownfield redevelopment in the United States. Some 165,000 tons of contaminated soil and other material were removed from the site over a period of two years. Thousands of cubic yards of concrete from the old foundation of the steel mill were broken into small pieces and reused as backfill.

The project is also being lauded by environmentalists for its varied forms of transportation access. With funds from the federal and state governments, a multi-modal bridge is being built across an interstate highway to connect Atlantic Station to the heart of Midtown. The 130-foot wide bridge will include transit, pedestrian and bicycle elements as well as automobile lanes. The transit portion will include a clean-fuel, rubber-tire shuttle service that will circulate around the project and link to a MARTA subway station. Cars are not being shortchanged. Atlantic Station will contain more than 7,000 parking spaces, most of them in a huge underground parking deck.

It is difficult to say exactly how many construction jobs will be created by the Atlantic Station project, given that it will be built in phases over a decade. During the construction of the parking deck alone, there were as many as 200 workers on the job at any given time, including some union labor. Kevin Burchfield, Senior Project Manager for Vratsinas Construction Company, the general contractor, estimates that the number of construction jobs will climb to at least 800.[37] Once construction is completed, the project is expected to support about 20,000-30,000 permanent jobs.

Atlantic Station is being financed both by commercial loans and by the City of Atlanta's issuance of Tax Allocation District bonds, a form of tax increment financing in which a portion of increased property tax revenues from the new project is diverted to help pay for the development.

Mission Bay, San Francisco

Mission Bay is a 303-acre mixed-use development located south of San Francisco's financial district adjacent to the Giants' new baseball stadium. The project, whose master developer is Catellus Development Corporation, is expected to include more than 5 million square feet of office and commercial space, 750,000 square feet of neighborhood retail space, a 500-room hotel and some 6,000 low- and high-rise condominiums and rental apartments, about a quarter of which will be affordable under San Francisco's income guidelines. Public areas will include 49 acres of parks and recreational areas as well as entirely new and upgraded public infrastructure, which is being financed by $71 million in tax-exempt bonds issued by the San Francisco Redevelopment Agency. The site will be accessible to various forms of public transportation, including a shuttle connecting to the BART subway system.

In addition to the residential and commercial components, Mission Bay will include a new 43-acre research campus for the University of California at San Francisco. The campus, which will focus on biotechnology and the life sciences, will include 20 structures with 2.65 million gross square feet of program space built over the course of 15-20 years.

Victory, Dallas

Victory is a 72-acre mixed-use brownfield development at a site alongside the Stemmons Freeway that was once the home to a city dump, a railroad maintenance facility, an aging power plant and some abandoned grain silos. The site now contains the American Airlines Center sports arena, which is serving as the anchor for additional development expected to encompass some 8 million square feet. Last July the project's main developer, Hillwood Development Corp., announced plans for a $100 million hotel and residential tower on the site that would be built in partnership with Gatehouse Capital Corp. Hillwood, whose chairman is Ross Perot Jr., was also the co-developer of the American Airlines Center.

Orenco Station, near Portland, Oregon

Unlike the other projects being profiled here, Orenco Station is technically in the suburbs (in the town of Hillsboro), but it deserves to be included because it is one of the prime examples of transit-oriented smart growth. The 190-acre community is a pedestrian-oriented, mixed-use development that is conveniently linked to downtown Portland through the Tri-Met MAX light-rail line. Developed by Pacific Realty Associates, Orenco Station has a variety of building types–ranging from apartments and lofts to single-family homes–among its roughly 2,000 units. Unlike traditional subdivisions, Orenco has townhouses integrated with the detached houses. The town center has 27,000 square feet of retail space and 30,000 square feet of commercial space.

Gates Rubber Factory site, Denver

Cherokee Denver LLC, a subsidiary of brownfield redevelopment specialist Cherokee Investment Partners, is the master developer for a 50-acre project on the site of an old rubber factory in Denver. Cherokee is still in the early stages of environmental remediation on the site, which is being targeted for some $1.5 billion of investment over the course of 10-15 years. The project will contain residential, office, retail and entertainment space with access to a light-rail station and a park-and-ride facility. There have been press reports that Cherokee may seek up to $166 million in public funding for the project. The labor-supported Front Range Economic Strategy Center has been negotiating with Cherokee on a community benefits agreement for the project. Among the Center's demands are a project labor agreement for the construction work, the inclusion of affordable housing in the project, local hiring preferences, living wage levels and health care benefits for retail employees, and child-care services for workers both during construction and final occupancy.

The Gulch, Nashville

The Gulch is a 55-acre residential and commercial project located in a former industrial section of downtown Nashville. The development firm of Armistead Barkley Inc. plans to invest up to $400 million to create 800,000 square feet of office space, 300,000 square feet of retail and several thousand residential units. Once fully built, the project is expected to support about 3,000 permanent jobs. Bill Barkley, a principal of the development firm, says the plan is to preserve the rail bed that currently runs through the site for a possible commuter rail or light rail connection.[38]

Civano, Tucson

This mixed-use community is designed to contain some 2,600 houses and apartments and 1 million square feet of commercial, retail and light industrial space. Civano's homes, which range in price from the mid-$100,000s to the high $200,000s, incorporate energy-efficient building materials and solar technology. The community also contains New Urbanist features such as front porches and a level of density so that more than half of the residents are within a five-minute walk of the town center.

New Mexico's Downtown, Albuquerque

Arcadia Land Company and the McCune Charitable Foundation, operating as the Historic District Improvement Company, are developing a total of more than 500,000 square feet of retail, office space and residential units in downtown Albuquerque. The $350 million-plus project also incorporates government offices and court facilities. The anchors of the project are the Century Theatres Block, an entire city block devoted to entertainment, restaurants and offices, as well as Crossroads, a complex of buildings at the historic center of the city.

Pabst Brewery site, Milwaukee

In early 2003 Juneau Avenue Partners, a joint venture of Wispark LLC and the Ferchill Group, announced plans for a $300 million project that will transform the long-vacant Pabst Brewery complex in Milwaukee into a 1.6 million-square-foot entertainment and residential complex. The seven-block site would include about 650 residential lofts, about 225,000 square feet of office space, with the rest devoted to retail, restaurants, movie theatres and a possible skating rink. Most of the project would involve the reuse of historic brewery buildings, but some structures of more recent vintage would be razed to allow for some new construction.

NOTES

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17. U.S. Bureau of the Census, *1972 Census of Construction Industries,* Washington, DC: August 1975, U.S. Summary Table A1, p.1-2 and Table B1, p.1-8.

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26. RSMeans based its labor cost estimates for this project on union wage rates, even for projects that were built non-union. This means that there is an upward bias in the absolute

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Appendix

The Effect of Regional Smart Growth on Metropolitan Growth and Construction: A Preliminary Assessment

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Introduction

Since the end of the second world war, the United States has seen a transformation of its built landscape. Downtown and central city dominance has given way to urban sprawl leading to what some now call the "edgeless city" (Lang 2003). Many bemoan this transformation (e.g. Kunstler 1994) while others observe it is the natural course of events (e.g. Mills and Hamilton 1989). In recent decades, some local, regional, and even state governments have embarked on various "smart growth" initiatives to reign in urban sprawl such as statewide growth management and urban containment (see Nelson and Duncan 1995).

In this discussion, we engage in a preliminary assessment of the extent to which regional smart growth efforts affect growth and construction measured at the metropolitan scale over the period 1985 through 1995. We begin with a review of urban sprawl and the role of smart growth in managing it. We continue with preliminary assessments of the differences between regional smart growth and business as usual on metropolitan growth and construction activity. We conclude with general observations but caution that this is merely a preliminary assessment.

Urban Sprawl and Regional Smart Growth

Urban sprawl is fueled by pull and push factors. Among the pull factors are a variety of economic, technological, cultural, and public policy influences. Certainly, exurbia exists because of the shift of jobs from central cities and first tier suburbs to the suburban employment ring of metropolitan areas. The problem in many central cities and close-in suburbs is a dearth of available land at competitive prices; this is not a problem in exurbia. New development is thus lured to or pulled into exurbia for this reason. The result is that formerly rural areas have become accessible to workers looking for new places in which to live.

Population and employment deconcentration is made possible largely through significant improvements in technology. While neither a push or pull factor per se, new technologies such as the personal computer, cellular telephones, satellite linkages, and the internet allow millions of people to live and work practically anywhere.

Economic and technological changes merely make living farther out possible but it does not explain household's underlying desire to do so. What may drive households farther out is cultural anti-urbanism characterized by the Jeffersonian "gentleman farmer" ideal – a potent pull factor. While households may be pulled to the rural landscape for cultural reasons, many others are pushed in their search for locations allowing them to escape from the noise, congestion, pollution, micro-climatic conditions, ethnic and racial diversity, and crime associated with urban areas.

Facilitating urban sprawl are a variety of public policies supporting a vast highway system, home mortgage programs and tax subsidies, under-priced fossil fuels, and disaster insurance or relief that enable development of hazardous and sensitive landscapes. Bourne (1980) argues that is it the implicit urban policy of the United States to favor development of outlying areas over reuse, redevelopment, or rehabilitation of central areas.

Another important push factor is uncoordinated development within metropolitan regions. Most regions do not engage in coordinated land use planning with the result that local governments – usually cities and counties – go it alone in fashioning their development patterns. The result is that while some attempt to accommodate their proportionate share of all a region's growth, many others cater to only the kind and amount of the region's development they wish to have. The rest is pushed outward. How much of exurbanization is attributable to pull or push factors is not known.

The effects of urban sprawl has become of concern to a growing number of public policy-makers. Urban sprawl requires that resources be plowed into public services, facilities, and transportation systems that are very costly to provide over large areas and at low density. For example, in terms of roads, urban sprawl may exacerbate existing or imminent problems. One outcome is more and longer trips. Moreover, because urban sprawl is highly diffuse, connecting outermost areas to employment centers via bus or rail lines is not cost effective. Alternatives such as pricing schemes to discourage urban sprawl or change travel behavior may be difficult to implement. At the same time, the presence of households in sprawling area may encourage even more deconcentration of employment. This appears to be happening in the manufacturing industries.

Then is also the concern that urban sprawl will eventually demand, or require, urban level services spread over vast territory and at high cost. Households locating at the suburban fringe may enjoy low taxes that pay for low quality services, or no services, but in time they may demand higher quality services. More insidious would be the proliferation of private on-site or small scale water and wastewater systems that, over time, fail and need to be replaced with public systems. At low development densities, these systems would cost considerable amounts of money. Suburban fringe residents may pay for some of the cost, but much of the cost could be borne by small town residents who have the systems, state agencies under health hazard provisions, and the federal government.

Ultimately, there is the concern that urban sprawl weakens efficiencies associated with urban agglomeration. That is the concern of this analysis.

In response to urbanization patterns leading to what may be termed "urban sprawl," dozens of local, regional, and state governments have embarked on "smart growth". Although perceived popularly in such forms as the "new urbanism" and "transit oriented developments," for our purposes we consider "regional" smart growth initiatives that aim to contain urban sprawl or at least reduce its extent. At its heart, regional smart growth aims to synchronize key public facilities with urban development pressures, preserve open spaces, and facilitate development in ways that preserves public goods, minimizes public costs, and accounts for development impacts by those who cause them (Nelson and Duncan 1995; Nelson and Dawkins 2002).

Does regional smart growth improve the metropolitan economy? This preliminary assessment has two elements. The first evaluates the difference in growth rates among the 35 largest metropolitan statistical areas (MSAs)--or the largest primary MSAs (PMSAs) in consolidated MSAs (CMSAs)--during the 1990s with respect to "business-as-usual" (non-smart growth) and regional smart growth metropolitan areas. Regional smart growth metropolitan areas are those with metropolitan-wide growth management or growth management in large sub-metropolitan areas such as counties. The second uses a sample of data collected for a study sponsored by the National Science Foundation to compare new construction activities between a group of business-as-usual and regional smart growth metropolitan areas. This is followed by a discussion suggesting results are consistent with expectations that regional smart growth generates measurable benefits for the metropolitan economy. Policy implications and qualifications combined with a call for more rigorous research concludes this preliminary assessment.

Does Regional Smart Growth Dampen Development?

We apply this question to the 35 largest MSAs as ranked by the U.S. Census Bureau (http://www.census.gov/population/cen2000/phc-t3/tab03.pdf).[1] While the rankings include consolidated MSAs, we believe it was more appropriate for this analysis to focus on contiguous metropolitan/urban fields so the largest MSAs or primary MSAs within CMSAs as defined in 1990 were used to analyze population and urbanized area changes from 1990 to 2000. Future research may be more inclusive and include all MSAs/PMSAs of more than 1 million population in 2000. Table 1 shows the MSAs/PMSAs, ranked by their population growth rate in the 1990s. This table also shows the degree to which urban containment is employed, whether none, natural, weak, or strong based on work recently reported by Nelson and Dawkins (2002).

Only about a third of metropolitan areas analyzed utilize some type of regional smart growth. Los Angeles, Las Vegas, and Phoenix are naturally contained. We say "naturally" because in the case of Los Angeles oceans and mountains rising to more than 10,000 feet hem development into a basin.[2] Las Vegas and Phoenix are naturally contained because of public ownership of vast amounts of land around them, and water that is expensive to acquire, treat, and distribute. Eight metropolitan areas have what we call regional smart growth: Orlando, San Francisco, Twin Cities, Miami, Portland, Sacramento, San Diego, and Seattle. We included MSAs/PMSAs that employed containment policies since 1990, which means we classify Denver, Milwaukee, and Philadelphia as having no regional smart growth even though each implemented some form of metropolitan-wide smart growth effort later in the 1990s. It is interesting to note that among the top 10 fastest growing metropolitan areas, half have some sort of regional smart growth and half do not. Among the bottom 10 in growth rates, only one has some form of regional smart growth and all the rest do not. It seems sensible that regional smart growth is more likely to be used where growth occurs and not where growth does not.

In any analysis of the sort we are conducting, namely comparing changes in outcomes over time between different regimes of metropolitan growth management, one must be cognizant of "logical fallacy" – assuming an effect when it comes before the cause or the issue of interaction between causes and effects. There is little absolute certainty of avoiding this but we can start with estimating the statistical relationship between growth rate and containment regimes. In the model:

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1. For definitions, see Census (1998).

2. It is not "sprawl" that makes Los Angeles what it is; it is actually the nation's most densely settled metropolitan area.

% POPULATION CHANGE(1990-2000) =

f(SMART GROWTH, NATURAL CONTAINMENT)

where the independent variables (binary) are regional smart growth or natural containment, the null hypothesis is no statistically significant association between metropolitan population growth and regional smart growth or natural containment type. If the null hypothesis is rejected we might be concerned that regional smart growth is influenced by growth or vice versa, and that more complex interactions between growth and policies need to be explored. In the ordinary least squares regression of the model, we find:

% POPULATION CHANGE (1990-2000) =

*0.151 + 0.054**x**SMART-GROWTH(0.064) + 0.334**x**NATURAL-CONTAINMENT(0.097)**

where standard errors are in parentheses. The coefficient of determination is modest at 0.27, meaning that 73 percent of the variation in percent population chance is attributable to factors other than those represented in the model. Among the independent variables, only natural containment is statistically significant at conventional levels (* = $p<0.05$). This simple test suggests that there is no association between growth and regional smart growth. Although we do find an association with respect to natural containment we surmise that it is nonetheless not influenced by explicit containment policy.

In general, we do not find support for the proposition that regional smart growth per se dampens growth measured in terms of population change. If regions grow with or without smart growth, is there a difference in *how* they grow from the perspective of construction activity related to growth? That question is addressed next.

Table 1. Total Metropolitan Population Growth Rate by Rank

MSA/PMSA	Regional Policy	1990 Pop.	2000 Pop.	Change	Percent
Las Vegas	Natural	693,486	1,332,116	638,630	92.1%
Atlanta	None	2,450,009	3,588,326	1,138,317	46.5%
Phoenix	Natural	2,016,557	2,940,555	923,998	45.8%
Charlotte	None	858,386	1,194,106	335,720	39.1%
Orlando	Smart	973,728	1,329,992	356,264	36.6%
Dallas	None	2,341,044	3,127,857	786,813	33.6%
Denver	None	1,543,161	2,018,398	475,237	30.8%
Portland OR	Smart	1,305,506	1,689,578	384,072	29.4%
Houston	None	3,046,597	3,868,908	822,311	27.0%
Salt Lake City	None	1,019,106	1,279,993	260,887	25.6%
Sacramento	Smart	1,322,801	1,631,443	308,642	23.3%
Indianapolis	None	1,060,336	1,284,812	224,476	21.2%
Seattle	Smart	1,837,763	2,202,300	364,537	19.8%
Tampa	None	1,867,420	2,211,981	344,561	18.5%
San Antonio	None	1,179,558	1,394,810	215,252	18.2%
Miami	Smart	1,894,156	2,227,073	332,917	17.6%
Minneapolis	Smart	2,173,122	2,543,126	370,004	17.0%
Columbus	None	1,140,773	1,326,787	186,014	16.3%
Washington DC	None	3,729,991	4,262,228	532,237	14.3%
San Diego	Smart	2,335,227	2,639,250	304,023	13.0%
Kansas City	None	1,368,375	1,532,529	164,154	12.0%
New York	None	8,548,640	9,314,235	765,595	9.0%
Norfolk	None	1,272,522	1,384,597	112,075	8.8%
Chicago	None	6,005,800	6,483,652	477,852	8.0%
Los Angeles	Natural	8,739,001	9,416,396	677,395	7.8%
Cincinnati	None	1,293,911	1,392,266	98,355	7.6%
San Francisco	Smart	1,546,765	1,660,953	114,188	7.4%
Boston	None	3,622,560	3,853,480	230,920	6.4%
Detroit	None	4,039,377	4,276,490	237,113	5.9%
Milwaukee	None	1,323,325	1,392,283	68,958	5.2%
Philadelphia	None	4,602,147	4,809,778	207,631	4.5%
New Orleans	None	1,139,953	1,175,419	35,466	3.1%
St. Louis	None	2,173,853	2,235,106	61,253	2.8%
Cleveland	None	1,704,437	1,740,300	35,863	2.1%
Pittsburgh	None	1,774,754	1,718,259	(56,495)	-3.2%

Regional Smart Growth and Construction Activity

To compare construction activity between business-as-usual and regional smart growth metropolitan areas, we use data compiled by Raymond J. Burby and others for research sponsored by the National Center for the Revitalization of Central Cities. The data include the value of residential and nonresidential construction for a sample of 155 metropolitan areas covering the period 1985 through 1995, a total of 11 years. The data are organized by the Census Bureau's 1993 definition of metropolitan status. This period covers a complete business cycle that takes into account periods of peak construction, downturns and upturns, and periods of recession. Per capita values per new resident are used to control for variations in population across central cities and metropolitan areas.

Because developers base construction decisions on different location factors when considering residential and various types of nonresidential construction, we include seven types of construction activity: new single-family detached and multifamily housing; industrial, office, and retail/warehouse buildings; and residential and commercial rehabilitation projects. Separate analysis of each category of construction helps to avoid potential counteracting forces that are not revealed when all categories of construction are combined into a single measure of construction activity (see Bartik 1991). Construction data come from building permit information provided annually by cities and counties to the U.S. Bureau of the Census. For this preliminary assessment, however, we report aggregate residential and nonresidential construction. As a footnote, "construction" does not include land, exactions, costs associated with permit processing, or other activities (see Census Bureau definitions for construction costs).

The status of regional smart growth in each metropolitan area in the sample was determined through a telephone survey in 1999 and 2000 of planning directors in each metropolitan area. Regional smart growth is determined to exist by the existence of a formally adopted containment policy (growth boundary, service extension limits, or greenbelt) in each metropolitan area prior to the start of the study period in 1985. In addition, we determined the year in which regional smart growth programs were established to test the proposition that effects would be more pronounced the longer programs were in existence (no consistent effects of length of program were found, however). More complete survey work on regional smart growth has recently been completed by Nelson and Dawkins (2003).

Nearly all regional smart growth metropolitan areas comprising this sample can be characterized as "growth accommodating." That is, nearly all (there are only five exceptions) have plans designed to explicitly accommodate projected metropolitan growth and have long-range infrastructure plans in place to facilitate this. The usual suspects include some of the nation's fastest growing metropolitan areas including

Miami, Orlando, Portland (Oregon), San Diego and Seattle and some that are growing at or below the national average such as Baltimore, Lincoln, Milwaukee, and Rochester MN. Such “growth restrictive” metropolitan areas as Boulder/Longmont (Colorado), Ventura County (California), and Loudon County (Virginia) are not included in the sample.

Descriptive comparisons are presented in Table 2. Of the 155 metropolitan areas sampled, 32 or 20 percent have some form of regional smart growth present while the remaining 123 or 80 percent do not. Growth rates of the two groups are surprisingly similar, being 5.5% and 7.1% for business-as-usual and regional smart growth metropolitan areas respectively. Both groups also saw reasonably robust construction activity: $647 billion for business-as-usual metros compared to $272 billion for regional smart growth metros. For the most part, the similarities appear to stop there, however.

On the basis of new construction per new resident, regional smart growth metros saw more activity than business-as-usual metros in terms of both residential and nonresidential construction. For residential construction, regional smart growth activity averaged about $296,000 per new resident compared to about $212,000 per new resident in business-as-usual metros, about 39 percent more. Because land and other costs are not included, the results indicate that residential units of higher value were being constructed in regional smart growth metros relative to business-as-usual metros. We suspect that the difference is attributable to the higher costs associated with infill and redevelopment, and the usually higher unit cost of renovating older buildings than constructing new. Also, we suspect that existing residential properties are more likely to be renovated in regional growth management areas than not. This is only speculation, however. More rigorous assessment should be undertaken.

The situation is similar but less dramatic for nonresidential construction where regional smart growth metros saw an average of about $112,000 per new resident compared to about $101,000 per new resident, or about 11 percent more. The difference may be attributable to higher costs associated with more intensive development, such as more multi-level buildings requiring elevators than may be seen in sprawling suburban areas. Infill and redevelopment, and renovation costs may also be a factor.

Table 2. Construction in Smart Growth and Business-as-Usual Metropolitan Areas, 1985-1995

Indicator	Business As Usual	Smart Growth
Population Growth		
Population 1980	37,509,474	9,392,202
Population 1990	39,575,862	10,058,309
Population Growth	2,066,388	666,107
Growth Rate	5.5%	7.1%
Number of Metros Sampled	123	32
Residential Construction		
Res. Const '85-95 (000)	$439,069,192	$196,889,455
Res. Const/New Res.	$212,481	$295,582
Smart Growth Difference		$83,101
Smart Growth Percent		39.1%
Nonresidential Construction		
Nonres. Const '85-95 (000)	$208,341,079	$74,782,990
Nonres. Const/New Res.	$100,824	$112,269
Smart Growth Difference		$11,445
Smart Growth Percent		11.4%
Total Construction		
Total Construction	$647,410,271	$271,672,445
Total Const./New Res.	$313,305	$407,851
Smart Growth Difference		$101,979
Smart Growth Percent		30.2%

Source: Adapted from Nelson, Burby et al. 2004.

One of the explanations for the difference between construction figures in smart growth and business-as-usual metropolitan areas is the extent to which rehabilitation construction occurs. Modern building codes may make it more expensive to rehabilitate older buildings, thus making it relatively less expensive to build on green field sites rather than rehabilitate older buildings in central areas. If development is constrained from sprawling outward, closer-in sites become more attractive but because building codes drive up the cost of rehabilitation the amount of construction money spent per new resident also goes up. Table 3 compares rehabilitation investments between smart growth and business-as-usual regions. Here we find that rehabilitation investments are in the range of $100,000 or 167% more per new resident in smart growth regions than in business-as-usual regions. This is essentially the entire difference noted in Table 2.

Table 3. Rehabilitation in Smart Growth and Business-as-Usual Metropolitan Areas, 1985-1995

Indicator	Business as Usual	Smart Growth
Rehabilitation (000s)	$124,384,084	$60,708,076
Rehabilitation/New Resident	$60,194	$160,828
Smart Growth Difference		$100,634
Smart Growth Percent		167.2%

Source: Adapted from Nelson, Burby et al. 2004.

Other comparisons can be made. Table 4 compares construction in three broad areas in business-as-usual and regional smart growth metropolitan areas. Industrial construction was somewhat higher in business-as-usual metropolitan areas but retail/warehouse construction was somewhat higher in regional smart growth metropolitan areas. A substantial difference exists in office/bank/professional building construction decidedly favoring regional smart growth metropolitan areas. We surmise that regional smart growth is usually associated with higher quality construction of these kinds of buildings. In addition, more intensive development associated with regional smart growth brings with it higher building costs such as elevators and steel-reinforced concrete construction of multi-level buildings. This implies that the while actual cost of new construction is not necessarily different between smart growth and business as usual regions, more rehabilitation investment is stimulated.

Table 4. Selected Nonresidential Construction, Smart Growth and Business-as-Usual Metropolitan Areas, 1985-1995

Indicator	Business as Usual	Smart Growth
Industrial Construction		
Industrial (000)	$38,808,919	$11,226,951
Value per New Resident	$18,781	$16,855
Smart Growth Difference		($1,926)
Smart Growth Percent		-10.3%
Office/Bank/Professional Building Construction		
Office/Bank/Prof.Bldg (000)	$53,763,192	$21,944,997
Value per New Resident	$26,018	$32,945
Smart Growth Difference		$6,927
Smart Growth Percent		26.6%
Retail/Warehouse Construction		
Stores/Warehouse (000)	$58,935,149	$19,935,753
Value per New Resident	$28,521	$29,929
Total Value Per New Res.	$73,320	$79,728
Smart Growth Difference		$6,409
Smart Growth Percent		8.7%

Summary, Interpretation, Limitations, Recommendations, and Implications

On the whole, we find that per new resident, new construction in regional smart growth metropolitan areas averaged about $102,000 or 30 percent more than in business-as-usual metropolitan areas. The entire difference appears to be attributable to rehabilitation investments. Our initial speculation is that while regional smart growth does not per se inhibit growth it may stimulate more rehabilitation than business as usual. This may be consistent with a growing literature suggesting that one element of regional smart growth, densification, leads to more economic activity and by implication more construction activity than lower densities (see Cervero 2000 for discussion). Our preliminary interpretation of the descriptive analysis is that regional smart growth appears to generate more total construction activity per new resident than business-as-usual albeit not any more *new* construction per new resident. Until more research is conducted, however, we are unsure about the reasons.

This analysis has important limitations that need to be addressed in future, more rigorous research. For one thing, it is based on data some of which are approaching 20 years old. For another, many more metropolitan areas today have some form of regional smart growth than did during our study period. Third, we did not control for a variety of factors that may help explain differences in construction activity such as central city-suburban interactions, land area, central city "elasticity" (Rusk 1993), market conditions, development constraints and so forth. Nor did we control for the possibility that regional smart growth per se may make such regions more attractive and therefore more prone to seeing higher construction activity than business-as-usual metropolitan areas. Finally, this analysis was of less than half the metropolitan areas; it would be better to have analysis that includes them all. Given these and certainly many other limitations, we recommend rigorous multivariate statistical analysis with more recent data that is applied to all metropolitan areas.

An over-arching implication may be derived from this preliminary assessment. If there is very little difference in growth rates based on business-as-usual or regional smart growth (see Table 1 and regression analysis), does regional smart growth really make a difference in other ways? The answer would appear to be affirmative. On the whole, with minor exceptions, building activity per new resident is decidedly higher in regional smart growth than in business-as-usual metropolitan areas.

There are other benefits to smart growth, as the literature is beginning to show. They relate to higher incomes (Nelson and Peterman 2000; Nelson and Foster 1999), improved public health (our interpretation of Frank, Engelke and Schmid 2003), reduced sprawl and improved land preservation (Nelson 1999), reduced racial segregation (Nelson, Sanchez and Dawkins, 2004a, 2004b), improved regional economic welfare (Nelson and Moody 2000); and apparently improved quality of life (Nelson 2000). Perhaps it is because of the accumulation of perceived and measurable benefits relative to business-as-usual that more communities and entire metropolitan areas are embarking on regional smart growth efforts. Not all such efforts improve or even facilitate development, however, as one of us (Nelson 2002) has speculated. A final call for research is therefore to understand the institutional composition of different varieties of regional smart growth to determine those that do the best job to sustain growth while also maximizing benefits and minimizing costs.

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