Study of Subdivision Requirements as a Regulatory Barrier

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Disclaimer

Executive Summary

Introduction

Local subdivision regulations represent a major tool by which local governments manage and shape the housing development process. In addition to laying land plats or site plans, these regulations establish infrastructure or site requirements to support new residential development, i.e., they establish specifications for streets, sidewalks, water and sewer, drainage, curbs and gutters, street signs, landscaping. In many cases, subdivision regulations also provide for trees, utility easements, and dedications of land or fees for recreational and/or school facilities. Subdivision regulations are intended to ensure that proposed housing developments are cost-effective (i.e., reduce extensive long-term maintenance by the locality), meet health and safety requirements, are properly designed, and have a favorable impact on the community.

The cost of these requirements represents a significant share of the cost of producing new housing. Such requirements can reasonably be considered "regulatory barriers" to affordable housing if the locally determined requirements are greater (and hence, more costly) than those necessary to achieve health and safety requirements in the community. This has been a concern for many years, and has been identified in the report, Not in My Backyard (prepared by the President's Commission on Regulatory Barriers to Affordable Housing) as a potential major contributor in raising the cost of housing and limiting the supply of affordable housing in communities.

To determine whether subdivision requirements exceed what is necessary to meet health and safety requirements, and hence likely to become a regulatory barrier, the Department of Housing and Urban Development commissioned a nationwide study. The key objective of the study was to develop a national estimate of the cost of excessive land and site development standards on single-family detached housing built in subdivisions. This is the type of housing most closely associated with the idea of homeownership in America. In order to measure which local standards are in fact excessive, the study commissioned nationally recognized land development experts to devise benchmark subdivision standards. Benchmark standards are standards necessary to achieve minimum acceptable health and safety benefit for the community. Such standards, and their corresponding monetary values, were devised for the most important development standards: lot size, floor space requirements, lot width, roadway width, sidewalk requirements, and curb & gutter drainage. The expert group in land and housing development consisted of residential land developers, architects, civil engineers, and land planners and was asked to develop benchmark standards for this study. Based on the

responses from this group, consensus benchmark standards were developed and used in this study as the basis for determining whether existing local standards were excessive.

METHODOLOGY: The study used a four-step methodology for developing the national cost estimates for those subdivision rules that constitute regulatory barriers: (1) collect regulatory standards from a nationally representative sample of jurisdictions for the selected subdivision and related zoning rules; (2) establish benchmark values and unit costs for each requirement; (3) produce a cost estimate for excessive regulation based on the application of the benchmark values and costs to the regulatory standards from the national sample of jurisdictions; and (4) create a national estimate of the costs of excessive regulations. For practical reasons, this study focused on only one type of zoning district- those that allowed the densest single-family residential development. If the study had examined all zoning districts in all jurisdictions, which would have included lower density districts, greater levels of regulatory cost barriers most likely would have been found.

SUMMARY OF FINDINGS

The overwhelming majority of communities in the study—94%-- mandate one or more land development standards for residential subdivisions. The most common regulatory standards were for lot size, front setbacks, off-street parking, and lot width. The least common requirements were for floor area and open space.

Ninety-one percent (91%) of all the communities had one or more regulatory standards that exceeded the benchmarks. Jurisdictions exceeded the benchmarks most frequently for off-street parking, front setbacks, lot width, and lot size. Jurisdictions exceeded the benchmarks least frequently for floor area, sidewalk requirements, open space, and sidewalk width requirements.

Lot size, lot width, and floor area accounted for the largest percentage of total costs for a variety of reasons:

Excessive lot size regulations accounted for the largest percentage of cost (65%). The cost of land is a major component of the cost of housing, so it should not be surprising that regulations mandating excessive lot sizes results in such a finding. Coincidentally, sixty-five percent of jurisdictions in the sample exceeded the lot size benchmark. On average, jurisdictions with excessive lot size requirements exceeded the benchmarks by 6,573 square feet (or more than one-seventh of an acre). The frequency and magnitude of lot size requirements greater than the benchmarks, combined with the cost of land, resulted in the regulatory cost barrier for lot size accounting for the majority of total costs of the regulatory cost barriers for all the land and site development variables considered in this study.

Excessive lot width requirements account for a moderate share of costs (9%), with 63 percent of jurisdictions containing lot width regulations exceeding the benchmarks. Excessive lot widths also have clear secondary cost impacts, i.e., they increase costing for land, sanitary sewer main, water main, street paving, curb and gutter, sidewalk construction, landscaping, and storm sewer.

Floor area had a disproportionately large impact on total regulatory barrier costs in proportion to the number of jurisdictions with excessive floor area requirements. While only 8 percent of jurisdictions had excessive floor area requirements, the regulatory cost barriers for floor area for those jurisdictions accounted for 17 percent of the total regulatory cost barriers for all land development variables for all the jurisdictions in the study. This resulted from the relatively high cost per square foot of required floor area and the fact that the mean differential between required floor area and benchmark floor areas was 354 square feet (or more than $26,000 per dwelling unit).

Key Findings

The average cost of excessive regulation resulting from subdivision standards for one dwelling unit was about 5 percent of the average cost of a new home. For the land development standards studied, the average regulatory barrier cost for one dwelling unit was $11,910. In comparison with the average cost for a new single-family dwelling in the United States in 2004 ($244,000), the average per-unit regulatory cost barrier is 4.8 percent of that average selling price.

The regulatory barriers cost varied. The regulatory barriers cost varied considerably across communities, as well as across regions and Metropolitan Statistical Area (MSA) status. Given that the sample is representative of all jurisdictions in the nation, the national regulatory cost barriers will vary by region and whether the jurisdiction is part of an MSA. The actual regulatory barrier cost for any given jurisdiction of course, depends on actual local regulations and costs of development.

Of the two types of "models" used to make the national estimates—aggregated and disaggregated--the disaggregated model provides the best national estimate of the land development regulatory barrier costs. The disaggregated model accounts for variations in regulatory standards and costs among the Census regions and MSA status better than the aggregated model. The total mean regulatory cost barriers for land and site development standards in the disaggregated model was about $14.6 billion for the nation in 2004.

Conclusion

This study is the first effort to quantify, on a nationwide basis, the costs of excessive site development regulation on affordable housing. The common rationale for such requirements is

that they enhance the soundness, livability, and sustainability of a community. The purpose of this study, however, has not been to deny that such standards have important benefits for the community, but to broaden the perspective of what other values and goals can and should be embodied in the housing development regulatory process, and to call attention to the impacts that excessive requirements have upon affordable housing. The additional cost pressures such standards impose on new housing may also help increase the prices of existing housing.

The findings themselves are not surprising; but they confirm and quantify, through an empirical study, what has been well-known, but unverified, throughout the workforce housing community—that large lot zoning and various site development requirements—limit or prevent the development of affordable housing. Such requirements, then, can harm a community's ability to provide what is, or ought to be, a high priority community goal.

The $14.6 billion national estimate for the land development regulatory barriers costs is a very conservative estimate. For practical reasons, this study focused on only on one type of zoning district, i.e., one that allowed the densest single-family residential development. If the study had examined all zoning districts in all jurisdictions, which most likely would have included lower density districts, far greater levels of regulatory barriers cost would have been found. For example, in medium-density residential zoned districts typically found next to the dense zoning districts, required minimum lot areas are generally larger. One would expect to find greater regulatory barrier costs in such neighborhoods *vis* a vis. high-density areas. Hence, the regulatory barriers cost resulting from required lot sizes greater than the benchmark lot areas would have been larger if these medium-density residential zoned districts had been included in the regulatory barrier cost analysis. Also, the estimate of housing construction costs on a square foot basis associated with excessive floor area standards was relatively conservative. Further, in lower density areas experiencing high housing construction, regulatory cost barriers based on average land costs and total housing construction starts for the Census region may underestimate the actual regulatory cost barrier from lot size requirements within that region.

The results presented here can serve as an opportunity and an invitation for communities as part of their commitment to affordable housing, to review and assess their own land and site development requirements. In order for local and state policies to have the greatest impact on the reduction of regulatory cost barriers associated with land and site development standards, efforts should focus on the most significant land and site development regulatory barriers identified in this study: excessive zoning regulations and excessive house size requirements.

Local advocates for reduction in regulatory cost barriers may wish to use the regulatory barrier costing tool, described in section 4.2.1.1 (and presented in Appendix G) to determine the regulatory barriers costs that apply in specific locations. This computer-based tool incorporates the benchmark standards used in this study as the baseline for judging a community's regulatory

standards. A community's calculation would be based on local land costs and on the cost of land development standards adopted by the local land planning jurisdiction or jurisdictions.

Communities committing to this self-assessment exercise, will not only be contributing to our understanding of a significant dimension of regulatory barriers costs, but will also be advancing their own efforts to expand affordable housing opportunities.

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1. Introduction

This study addresses the characterization on a national basis of the regulatory cost barriers associated with land subdivision, specifically barriers to the subdivision of land that can be developed with single-family detached (SFD) dwellings. Previously, this issue has been addressed only on a very small geographic scale. Previous approaches have not been used to examine regulatory cost barriers at the national level.

As discussed in the Executive Summary, there are two distinguishable types of regulatory barriers for the subdivision of land to construct single family detached dwellings: — a) barriers which lengthen the time for approval of a subdivision and b) land development and site development standards which are more costly than a set of minimum "benchmark" standards selected to provide for public health and safety. Benchmark standards are intended to be appropriate for affordable single-family detached dwellings without adding costs that would not bring commensurate public health and safety benefits. There are added costs when land is developed according to standards larger than the benchmark standards and there may also be benefits associated with those larger standards. The question of whether the added benefits are commensurate with the added costs is dependent upon many considerations. The evaluation of whether some of the benefits may be commensurate with the costs is an area that merits considerable investigation but is outside the scope of this study.

Land development standards investigated by the research team included standards associated with zoning requirements such as lot size as well as standards associated with subdivision rules such as lot width, interior floor space, building setbacks from the street, rear and side property lines, street widths, requirements for sidewalks and requirements for open space. This specific set of land development standards was selected for study by the research team based on our literature review. These specific standards have been identified as having the potential to significantly increase the costs of residential building lots. Based on existing research approaches, measuring the costs which are attributable to the differences between the existing land development standards and the benchmark standards require:

1. Knowledge and analysis of existing local requirements or standards
2. A set of alternative standards (the benchmark standards) which provide for public health and safety and could apply to a broad range of jurisdictions across the county
3. A methodology for costing the existing and the benchmark standards
4. A methodology for projecting the implications of the cost differences, if any, to the price of housing
5. A methodology to estimate the number of families affected by the cost differential between the existing standards and the "benchmark" standards

Measuring administrative and process costs in a quantitative approach was outside of the scope of this study. A quantitative approach to these costs would require extensive knowledge of the local administrative review process, the out-of-pocket costs associated with the local review process, assumptions about time and opportunity costs, a methodology for measuring such costs, and a benchmark review process, either actual or model, against which to compare actual administrative and process costs.

The present study examined the standards that are currently enforced in subdivision controls and zoning ordinances. Toward that end, the research team developed and executed a plan to systematically collect and analyze, via a Microsoft Access database, a nationally-representative sample of the land development and site development standards contained in subdivision rules and zoning ordinances.

A set of benchmark standards was developed using a survey of land development professionals in both the private and public sectors. The benchmark standards represent "best professional judgment" of the respondents to the survey. All such surveys are open to criticism with respect to the selection of the group being surveyed and the possible bias present in the individuals responding to the survey as compared with those individuals who did not respond to the survey. The research team reviewed the benchmark standards as compared with published model standards by several organizations. Where applicable, the benchmark standards were also reviewed with respect to median or the average values for the standards contained in our nationally representative database of existing land development regulations and with the median or average values of dwelling and house lot characteristics from the 2005 U.S. Census of Residential Construction.

The currently enforceable land and site development standards were then compared with the benchmark standards that would promote public health and safety. The research team also used engineering construction cost estimating methods to establish the incremental cost differences between the land development standards contained in the nationally representative database and the benchmark standards. This approach allowed the team to estimate the regulatory cost barriers due to land or site development standards greater than the benchmark standards for each of the planning jurisdictions recorded in the database.

Where the standards of a given jurisdiction were found to be the same or less expensive that the benchmark standards, there were no cost barriers related to land or site development standards in that planning jurisdiction. Conversely, if the standards of the jurisdiction were greater and more costly than the benchmark standards, the team assigned quantifiable regulatory cost barriers due to the standards enforceable in that jurisdiction.

A data weighting method was developed using the cost barrier estimates from the study's nationally representative sampling of planning jurisdictions to estimate the cost barriers existing in the general population of all planning jurisdictions in the United States.

2. Background

Since the early 20th century, there has been concern about the impact of regulations on housing costs, and whether certain regulations are too complex or have excessive standards. Many studies have been conducted to address these issues. One of the missions of the U.S. Department of Housing and Urban Development (HUD) is to promote policies which lead to a sufficient amount of affordable housing nationwide. In support of that mission, HUD maintains the "Regulatory Barriers Clearinghouse" for issues and information relevant to the promotion of affordable housing.[i] Ratios of median house prices to median household incomes are currently at a 25-year high in more than half the evaluated metropolitan areas in the United States (Harvard, 2005).

Most previous research on the regulatory cost barriers to affordable housing considered the effects of whole categories of regulations, of non-subdivision regulations (such as building codes), or of general development patterns. Few studies have focused on individual, subdivision rules or zoning ordinances, or have analyzed them on a national scale. One reason for this, as noted by the U.S. President's Commission on Urban Housing (1969), has been "the lack of a comprehensive, up-to-date survey on the provision of ordinances throughout the nation…" For the purpose of the present study, a regulatory barrier is a public regulatory requirement or process that increases the cost of single-family detached dwellings with respect to benchmark standards that are intended to protect public health and safety.

One seminal study in Waukesha County, Wisconsin, used a cost barrier evaluation method based on estimated construction costs for various infrastructure standards. This study compared the costs for the range of land development standards present within that county.

According to government definitions of affordable housing, families should devote no more than 30 percent of their income to rent or mortgage payments and utilities. [ii] "Affordable housing" often simply means housing whose residents do not pay too large a share of their income on rent or mortgage. In the context of this study, "affordable means affordable to families earning less than four-fifths (80%) of the area's median income." [iii] These families are officially "lower income" households. The median family income in the United States is approximately $60,000 per year.[iv] Based on the guideline of the 30 percent of income for housing and 80 percent of median income standards, affordable housing on a national average would cost no more than $1,200 per month for rent or mortgage plus real estate taxes.

While often motivated by the intention to preserve existing property values within the community, subdivision rules and zoning ordinances may, as a side effect, increase the cost to build new single-family dwellings. The goal of this research project was to quantify the

regulatory cost barriers crated by planning jurisdiction requirements that are greater than benchmark standards for house square foot floor area, lot size, road width, etc.

This study also qualitatively characterized the reasons for delays that occur during the interactive process between a land developer and a planning jurisdiction during the approval of a proposed residential land subdivision. According to a developer in Phoenix, Arizona, who participated in a regulatory cost barrier focus group managed by the research team, the delay of one year in obtaining a subdivision approval for a typical subdivision of 40 acres and 160 homes would add about $2,250 to the cost of each home for interest charges alone. [v]

2.1 Subdivision Regulations and Zoning Ordinances

Local subdivision regulations represent a major tool by which local governments shape and control the housing development process. Subdivision regulations establish infrastructure (land development) and site (building lot development) requirements to support new residential development—i.e., they establish specifications for streets, sidewalks, water and sewer, drainage, curbs and gutters, street signs, landscaping, trees, utility easements, and dedications of land or fees for recreational and/or school facilities. Subdivision regulations are intended to ensure that proposed housing developments are cost-effective (i.e., reduce long-term maintenance), meet health and safety requirements, are properly designed, and have a favorable impact on the community.

Land use controls which exceed appropriate requirements, particularly subdivision regulation and zoning, which determine the type and design of development that may be built in a community, is identified in *Not in My Backyard* (HUD, 1991) as a major contributor in raising the cost of housing and limiting the supply of affordable housing in communities. This study stated that regulations (as a group, and not just their excessive elements) add 20-35 percent to the costs of new homes. According to *U.S. Department of Housing and Urban Development (HUD)- sponsored Joint Venture for Affordable Housing demonstration, reducing the cost of the "developed lot" was the greatest single factor in achieving housing affordability.*[vi]

These studies have identified two significant categories of costs associated with subdivision regulation: (1) administrative or process costs, which refer to the costs associated with developing and processing subdivision requests through the local government review process, including the out-of-pocket costs, application costs, and review costs, and costs of delay (time costs, opportunity costs); and (2) costs resulting from land and site development standards

(specified design and materials requirements for infrastructure and site features, such as requirements for rights of way, curbs/gutters, water and drainage systems, and land dedication requirements) which are greater than the standards needed solely to protect public health and safety.

Since the purpose of this study is to probe the link between subdivision regulations/zoning ordinances and housing prices, the research team's review of the literature covers two topics—model regulations and the cost of regulations. The first topic concerns what are considered minimum or typical standards. It can be argued that some regulations that exceed minimum standards add unnecessary costs to the subdivision process, and these costs can show up in the price of housing.

2.1.1 Literature Review

Introduction

The literature review for the most part revealed that very little published work has been done that has direct relevance to the quantification of regulatory cost barriers on a national basis. Few studies have been done examining the costs associated with subdivision regulations in general, much less those analyzing individual regulations or done on a national scale. One relevant study that quantified regulatory cost barriers for a single county in Wisconsin is reviewed in section 2.1.3.

A review of literature related to subdivision regulations could cover numerous topics, such as legal framework, historical rationale, and the actual subdivision process. As the purpose of this study is to probe the link between subdivision regulations and housing prices, this review covers existing land use regulations, model land use regulations, benchmark standards and costs of regulations where the required standard is greater than an applicable benchmark.

The literature of model land use regulations discusses what are considered minimum or typical standards. These standards are generally approached only from a performance perspective, without regard to the cost effectiveness of the proposed or recommended standard. The literature on the second topic, costs of land use regulations, is even more incomplete, because few studies have been done examining the costs associated with subdivision regulations in general, much less those analyzing individual regulations or done on a national scale.

Many codes also address one or more other subdivision issues, such as administrative processes, growth management tools such as fees and exactions, and environmental protection. These are not discussed here, for one or more reasons (such as, their presence varies widely across codes, or it is difficult to assign costs to them).

2.1.2. Regulatory Cost Barriers

Several references on model land use regulations were reviewed as part of the literature review [vii]; however these references were not of significant value in developing our estimates of the regulatory cost barriers associated with land and site development standards.

Nelson et al (2002), *The Link Between Growth Management and Housing Affordability: The Academic Evidence*, is a comparison of the economic impacts on housing prices of two land use regulation categories: traditional zoning and growth management. This paper makes an important point—housing prices are influenced by many factors, not just the costs of development and construction. Luger and Temkin (2000), *Red Tape and Housing Costs: How Regulations Affects New Residential Development*, documents procedural and administrative cost barriers to land development. From interviews of people involved in development in several communities, the authors of this document developed an idea of reasonable versus excessive regulations, and then calculated the costs of those excessive regulations to be $10,000 to $20,000 per unit. In the current context, a significant limitation of this study is the fact that it calculated costs for regulations as a group, not for just subdivision regulations and not for individual regulations.

Kennedy (2002), in *The Impact of Municipal Governments on Residential Housing: A Case Study of Single-Family Detached Housing, in Cary North Carolina*, identifies five development activities that affect housing costs—impact fees, restrictive zoning interpretation, administrative fees, excessive building codes, and required capital improvements (on- and off-site). The significance of this study's conclusions related to the overall costs of the development activities is limited by the fact that it is a case study of only one town, and the determination of "excessive" was made based on interviews of two employees of a developer.

Reducing Housing Costs Through Regulatory Reform: A Handbook for Colorado Communities (1999) reviews the literature on two issues—the financial impacts of various regulations, and the relative costs of regulations in general. On the first issue, the only study it mentions related to subdivision regulations is by Weitz (1982), *Affordable Housing: How Local Regulatory Improvements Can Help*. That study found the cost of excessive right-of-way widths was $700 per lot. Excessive was defined as the magnitude or quality of the standard exceeding what a developer would provide absent the regulation.

A study by German (1993), *Under Siege: What Regulations Cost Builders and Buyers*, compared the costs of building houses in two jurisdictions with different levels of regulation. The study found that regulations added $20,420 more to housing costs in the more regulated jurisdiction. However, this study only considered fees and building codes.

In 1987, the NAHB Research Center published a paper called "Affordable Residential Land Development: A Guide for Local Government and Developers." This paper reported results from the Joint Venture for Affordable Housing, an effort involving multiple organizations and more than 100 demonstration projects across the country to reform regulations and administration and determine the housing cost savings. Reforms fell into four categories—zoning regulations (primarily related to density), subdivision regulations, building construction innovations, and administration. On average, reforms saved $8,573 per unit, with three-

fourths of this coming from land use regulations, which means at most one-fourth, or $2,143, came from subdivision regulations.

2.1.3 Quantifying Cost Barriers for Specific Land-Use Regulations

As a first step in identifying the land development requirements that were appropriate to examine from the cost barrier perspective, the research team identified those infrastructure elements with standards that are most commonly referenced in subdivision rules and zoning ordinances (see Table B-1, Appendix B) :

- Streets (right-of-way width, grade)
- Street access (block length)
- Sidewalks (width)
- Parking (number of parking spaces required)
- Sanitary sewerage
- Utilities (easement widths)
- Open space (amount required)

However, there is considerable discrepancy across codes on the numerical standards proposed for these infrastructure elements. For some, such as sidewalk surface thickness and minimum number of parking spaces, there seems to be general agreement on standards:

- Sidewalk minimum surface thickness = 4 inches
- Minimum number of parking spaces = 2 per unit

But for most regulations that are commonly covered by subdivision codes, the proposed standards vary significantly. For example the following ranges of land use standards were present in the regulations reviewed:

- Minimum right-of-way width = 47-60 feet
- Vehicle lane width = 9-15 feet
- Maximum grade = 8-15 percent
- Minimum curb radius at intersection = 5-25 feet
- Minimum block length = 125-400 feet
- Sidewalk requirement criteria = from “where appropriate” to “always”
- Minimum amount of open space = 5-10 percent of gross area

One of the few studies to examine the costs of individual regulations is Schuetz and White (1992), *Identifying and Mitigating Local Regulatory Barriers to Affordable Housing in Waukesha County, Wisconsin*. The authors established three ways in which subdivision and zoning regulations can affect housing costs—through land costs, lot improvement costs, and housing construction costs. The effect of subdivision application processing delays and the impact of the delays on interest charges paid by the developer were not explicitly addressed. Schuetz and White collected the subdivision and zoning regulations for several jurisdictions in Waukesha County, and examined the minimum standards for each regulation. Minimum standards were defined by reputable agencies or by using the smallest values found in the County's jurisdictions. They then calculated the costs of County and minimum regulations, and compared these costs to determine which regulations unnecessarily raised housing costs and by how much.

The subdivision regulations that were found to have a significant impact on costs in the Waukesha study were:

- Sidewalk requirements
- Curb and gutter requirements
- Storm sewer requirements
- Impact fees
- Excessive right-of-way widths

Additionally, they found that certain excessive zoning regulations unnecessarily increase the costs of certain subdivision elements, by increasing the amount of materials needed.

- Excessive lot widths increase the costs of sewer mains, water mains, streets, sidewalks, storm sewers, and curbs and gutter.
- Excessive front yard setbacks increase the costs of sewer and water laterals.

The costs associated with these elements of subdivision construction are reported in Table 2.1. Note that these costs are per some unit associated with the material (for example, the street pavement costs are per square foot of pavement), not per housing unit.

Table 2.1: Average Per-Unit-of-Measure Costs of Selected Land Improvements in Waukesha County, Wisconsin

Selected improvements	Average Cost
Sanitary sewer/front foot (FF)	$25.01
Sanitary sewer laterals/lineal foot (LF)	$23.62
Water main total/FF	$18.80
Water lateral/LF	$16.00
Storm sewer/FF	$18.52
Street without curb and gutter/FF	$18.72
Mountable curb/LF	$5.48
Boulevard curb/LF	$6.23
Concrete sidewalk 4' W x 4" D/FF	$6.00

Source: Village of Menomonee Falls; Mike Mucha, City Engineer, Mequon, WI.; the University of Wisconsin-Milwaukee Urban Research Center, 1992

The Waukesha study estimated the unit costs for infrastructure elements related to the width of the lot based on a tabulation of contractor bids for land development. These unit costs were utilized to estimate the aggregate infrastructure costs for the roads, sidewalks, and utilities associated with the range of lot widths specified in each municipality within the county—from 60 feet, the smallest allowable lot width, to 200 feet, the most restrictive requirement for lot widths within the county (See Table 2.2).

Table 2.2: Lot Improvement Costs for Various Lot Widths in Waukesha County, Wisconsin

Lot Width	Front Setback	Street Width	Curb and Gutter	Sanitary Sewer	Water	Storm Water	Street	Sidewalk	Total Cost of Improvements
60	50	27	$ 328.80	$2,569	$1,788	$ 957	$ 907	$ 360	$ 6,910
66	50	27	$ 361.68	$2,699	$1,884	$1,053	$ 998	$ 396	$ 7,391
80	50	27	$ 438.40	$3,000	$2,110	$1,276	$1,210	$ 480	$ 8,515
100	50	27	$ 548.00	$3,431	$2,433	$1,595	$1,512	$ 600	$10,120
120	50	27	$ 657.60	$3,862	$2,756	$1,914	$1,814	$ 720	$11,724
130	50	27	$ 712.40	$4,078	$2,917	$2,074	$1,966	$ 780	$12,527
180	50	27	$ 986.40	$5,155	$3,724	$2,871	$2,722	$1,080	$16,539
200	50	27	$1,096.00	$5,586	$4,047	$3,190	$3,024	$1,200	$18,144

Source: Minimum zoning regulations adopted by Waukesha County municipalities, average local improvement costs. University of Wisconsin-Milwaukee Urban Research Center, 1992.

Other factors that need to be accounted for in assessing infrastructure costs for wider lots are costs for the extensions in the length of the sidewalks and the planting strips between the edge of the roadway and sidewalks. In addition to the costs to improve the raw land for the roads, sidewalks, and planting strips, there is an additional cost for the purchase of the raw land for these elements of infrastructure. The cost of infrastructure improvements associated with the street length (water supply, sanitary sewer, paving of road, sidewalk construction, and storm drainage) increased from approximately $7,000 to $18,000 per lot as the frontage per lot increased from 60 to 200 feet—equivalent to approximately $80 per linear foot of lot

frontage requirement. To put these on a per dwelling unit basis, you would divide by two assuming that you need to divide the additional cost s between the two facing houses across the street from each other. Also keep in mind these costs are in 1992 dollars.

The *minimum* and the *median* front setback requirements for Waukesha County, Wisconsin were 25 feet and 50 feet, respectively. In the study, the cost for the utility lateral lines plus the cost for driveway paving at the 25-foot setback was $2,000, and the cost at the 50-foot setback was $3,200. The difference in costs for these values of front setbacks was approximately $50 per foot of setback (1992 dollars).

Within Waukesha County, communities which are more urbanized or in high-growth areas allow development of smaller single-family lots than do more rural towns and villages. The smallest lot size approved for SFD homes in Waukesha County, Wisconsin in 1992 was 4,800 square feet. The median value for the minimum lot size for the highest density residential district permitting SFD homes for the 32 communities in Waukesha County was 20,000 square feet. The report did not attribute a specific cost differential to larger lot size requirements, probably due to the high spatial variability of land cost.

Minimum interior floor area requirements were noted as a possible significant contributor to regulatory cost barriers for affordable housing in the Waukesha study. The adopted minimums for the communities ranged from 900 to 1,500 square feet. The median required minimum floor area adopted in Waukesha County for a SFD residence in 1992 was 1,100 square feet; although the most frequently adopted minimum floor area was 1,200 square feet. These values for minimum floor area requirements are near the average values found by the research team for the nationally representative sample of jurisdictions. The study noted that although most of these minimum floor area requirements are considerably smaller than the homes built during the previous decade, the minimums can still be adjusted to allow more affordable housing to be constructed.

Open space requirements in subdivision rules may be stated in one of the principal formulae:

- Percentage of total subdivision land
- Number of square feet per dwelling unit
- Number of square feet per person

Using the applicable minimum lot area for a subdivision and the median household population in the United States—2.69 people per household based on the 2000 U.S. Census—the three measures of open space can be expressed in the same units of number of square feet per dwelling unit.

Open space requirements in Waukesha County at the time of the study ranged from 1,500 to 7,500 square feet per dwelling unit when sewer was available, and from 9,400 to 15,000 square feet in areas without municipal sanitary sewer service. Depending on the costs for additional raw land to provide for subdivision open space requirements, these standards may be a significant contributor to regulatory cost barriers.

Based on a comparison with the minimum development standards adopted in the county which were considered to be reasonable guideline minimums, the Waukesha County study listed the following five items as the most obvious steps to reduce the cost of finished dwellings:

- Decreasing the minimum lot size in the highest density single-family zone
- Reducing required lot width in these zones
- Reducing the front yard setback requirements in these zones
- Reducing the minimum floor area required in these zones
- Reducing the street pavement width in these zones

3. Existing Regulations

For the study detailed in this report, the project team assessed the cost impacts of regulatory barriers to the construction of SFD dwellings within subdivisions. In the quantitative portion of this study, the research team estimated the cost impacts of subdivision rules and zoning ordinances which require land or site development standards in excess of what is needed to protect public health and safety.

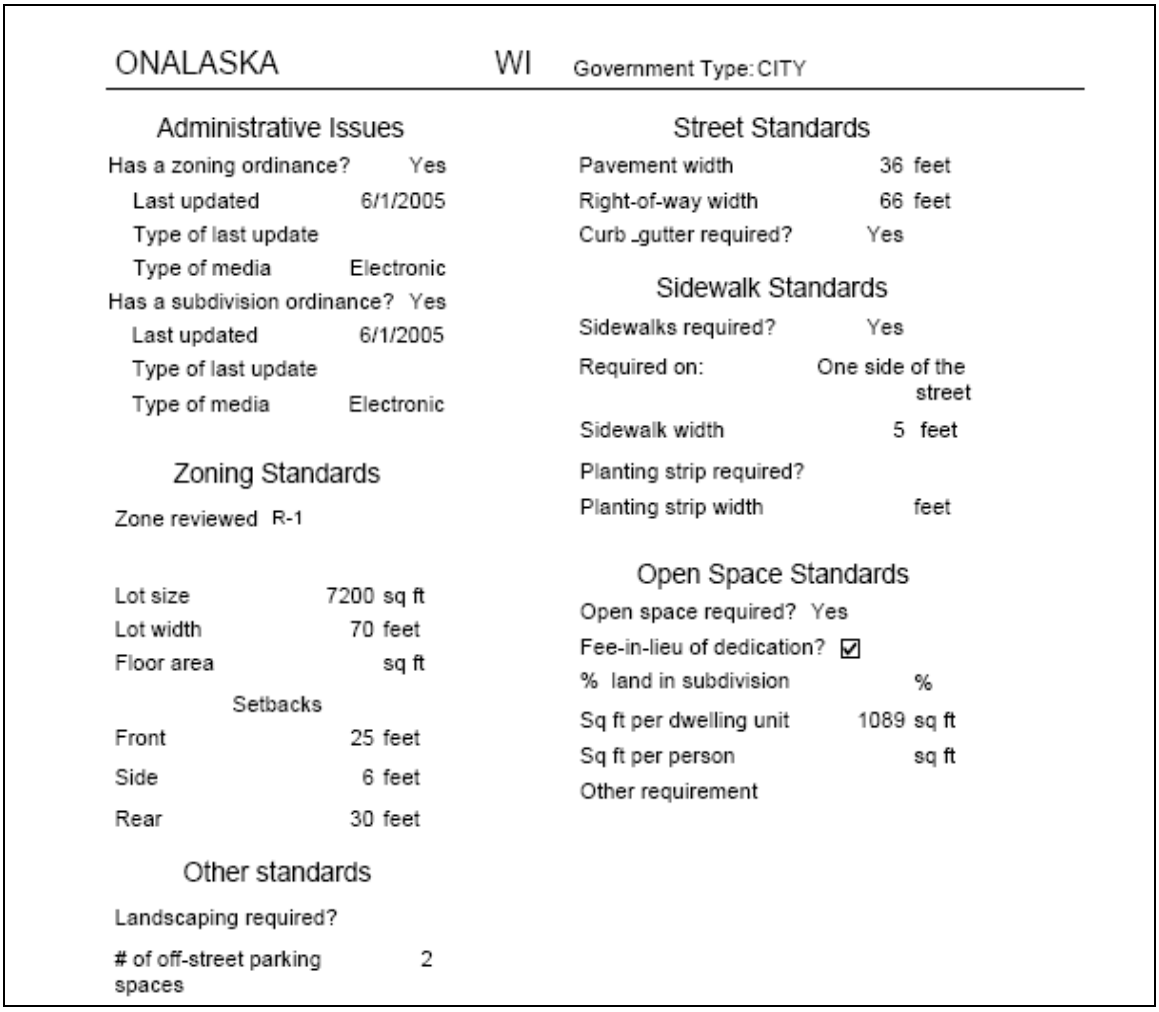
For the quantitative assessment of the cost barriers, the team sampled the land and site development standards in the subdivision rules and zoning ordinances of 469 separate municipal or county level planning jurisdictions. The sample was selected using statistical considerations in order to be representative of planning jurisdictions throughout the United States. Specifically, the team looked at the standards that applied to the subdivision of land for the construction of SFD dwellings. In most jurisdictions there is more than a single zoning district that allows these dwellings. In these cases, the study considered the zoning district that allowed the smallest lot sizes for SFD dwellings.

Land development and site development standards data were entered into a Microsoft Access database where they could be analyzed for a range of statistical measures and to quantify the effect of subcomponents of the sample. The team recorded key characteristics of each planning jurisdiction in the sample to ascertain the role of these characteristics with respect to the requirements for land and site development standards. These subcomponents of the sample included:

- Planning jurisdiction government type
- U.S. Bureau of Census region (Northeast, South, Mid-West, and West)
- Membership in a Metropolitan Statistical Area (MSA)
- Central city or outside central city
- Population separated into quartiles

The research team developed a basic descriptive reporting format for the collected data, which presents the recorded standards for each jurisdiction. An example of this format is presented in Figure 3.1.

Figure 3.1: Sample Database Report Output Format Showing Data Collected for Each Jurisdiction



ONALASKA WI Government Type: CITY

Administrative Issues

Has a zoning ordinance?	Yes
Last updated	6/1/2005
Type of last update	
Type of media	Electronic
Has a subdivision ordinance?	Yes
Last updated	6/1/2005
Type of last update	
Type of media	Electronic

Zoning Standards

Zone reviewed R-1

Lot size	7200	sq ft
Lot width	70	feet
Floor area		sq ft
Setbacks		
Front	25	feet
Side	6	feet
Rear	30	feet

Other standards

Landscaping required?	
# of off-street parking spaces	2

Street Standards

Pavement width	36	feet
Right-of-way width	66	feet
Curb _gutter required?	Yes	

Sidewalk Standards

Sidewalks required?	Yes	
Required on:	One side of the street	
Sidewalk width	5	feet
Planting strip required?		
Planting strip width		feet

Open Space Standards

Open space required?	Yes	
Fee-in-lieu of dedication?	☑	
% land in subdivision		%
Sq ft per dwelling unit	1089	sq ft
Sq ft per person		sq ft
Other requirement		

Source: EcoNorthwest, 2006

3.1 Sampling of Jurisdictions

The foundation of this study is a statistically representative sample of local governments (municipal and county level) in the United States that have the authority to adopt land use regulations. The sampling challenge was to develop a methodology that resulted in a random sample that is representative of the population. The objective of the project was to develop a sample that was: (1) geographically representative; (2) reflected the national distribution of population (including jurisdiction size); (3) reflected both fast and slow growing jurisdictions; and (4) represented a range of government types.

The project team selected jurisdictions based on weighing the sample by population in states and the amount of growth in each local government between 1996 and 2000. This methodology placed emphasis on the amount of population in each state, and ensured that both fast and slow

growing governments were represented. The rationale for the sampling methodology is described in sub-appendix A-2, contained in Appendix A – Survey of Regulatory Standards.

The sampling methodology originally intended to examine subdivision rules from 1,100 jurisdictions. When the project team began evaluating which standards to measure, it found that many of the relevant standards were in zoning ordinances, rather than subdivision rules. After consultation with HUD, the team decided to review both the zoning ordinances and subdivision rules and to reduce the sample size to 500 jurisdictions, reflecting the increased labor required for the collection and analysis of the zoning ordinances. In cases where the ordinances could not be obtained from the jurisdiction, the team employed a substitution method to choose a different jurisdiction. Ultimately 469 separate jurisdictions were included in the sample utilized for the national regulatory barrier cost estimates.

After selecting the sample, the project team collected zoning ordinances for review. The structure of a typical zoning ordinance presents some inherent analytical challenges. A typical zoning ordinance has three or more residential districts. The research team concluded that reviewing every residential district for each jurisdiction in the sample would be infeasible. Thus, the team developed a protocol for gathering ordinances that significantly reduced the data collection effort. The team focused on the "border" zone between low-density single-family development and high-density multifamily development because the land requirements are smaller (e.g., minimum lot sizes are typically smaller), which should result in lower housing costs. The "border" zone was defined based on the following characteristics: it permitted detached single-family houses outright; it had the smallest minimum lot size and setbacks; and, where applicable, it allowed a mixture of detached single-family houses and duplexes or multifamily housing. In cases where it was unclear which zone to choose after evaluating these characteristics, the research team opted for the zone with the smallest minimum lot size where SFD homes are permitted outright.

After collecting ordinances, identifying the appropriate zone for analysis, and inputting data, the research team conducted a statistical analysis of the sample. The analytical approach focused on two types of statistical analysis: (1) basic descriptive analysis; and (2) inferential statistics in the form of means testing. The basic descriptive analysis consisted of the following statistics: mean, median, mode (most frequently reported value), frequencies, range, and standard deviation. The means testing used chi-square and ANOVA with post-hoc testing to determine if the variables varied systematically by class membership within subcomponents of the sample including government type, Census region, membership in a Metropolitan Statistical Area (MSA), central city, and population quartiles.

3.2 Selection of Land Development Standards

The project began with a list of about 75 land or site development standards (referred to as "variables") that were considered for inclusion in this study. The team narrowed the list of variables by reviewing ordinances from 10 jurisdictions to assess whether subdivision ordinances commonly contained the standards on the list. Many site-specific variables on the original list were not in the initial 10 ordinances.

At that point, the team began considering expanding the scope of the project to include some variables from zoning ordinances because the preliminary research indicated that many standards, especially those related to lot size, which have substantial impact on housing costs, are not typically included in subdivision ordinances. The team reduced the number of variables to 15 and conducted a second review of 10 jurisdictions' subdivision and zoning ordinances to determine how frequently these variables occurred in the ordinances. This review showed that the variables on the reduced list were frequently found.

The list of variables was finalized based on the following criteria:

- **Expected impact of the variable on housing cost.** This was a critical factor. Some of the variables initially considered were estimated to have minimal impact on the cost of housing. For example, many of the jurisdictions in the preliminary review contained standards for the angle of street intersections, but, based on the team's expertise in residential construction, it was understood that this factor has little impact on the cost of housing in a subdivision.
- **Likelihood and ease of finding the variables within a zoning or subdivision ordinance.** A number of the variables that the team was originally interested in measuring were not generally found in either subdivision or zoning ordinances. For example, the minimum diameter of a sewer lateral or street pavement surface thickness was not often found in either the zoning or subdivision ordinances.
- **Ease of measuring the variables.** Some of the variables that were considered were difficult to measure. For example, landscaping standards vary substantially among ordinances. The team was unable to find a way to quantify such diverse standards. Instead, the researchers chose to identify whether or not each jurisdiction had landscaping requirements in their zoning or subdivision ordinances.

The following variables were selected for inclusion in the review of subdivision rules and zoning ordinances for this study:

- Lot width minimums
- Lot size minimums
- Yard set-back minimums (front yard, side yards, rear yard)
- Floor area minimums

- Off-street parking requirements
- Curb and gutter requirements
- Minimum street right-of-way width
- Minimum pavement width
- Sidewalk requirements
- Open space requirements
- Landscaping requirements

3.3 Definitions

This section includes definitions of terms that are used for the statistical analysis.

Means testing. This includes tests that describe the variation with in the sample. Types of means tests include: chi-squared and ANOVA.

Statistically significant. Results are referred to as statistically significant or significant if a statistical test shows a difference that is unlikely to occur by chance.

Chi-square. A statistical procedure used to test for differences between groups of categorical data. This technique makes use of data classified into a contingency table, and the results are based on a comparison of expected frequencies with observed frequencies. (For further details see http://www.statistics.com/content/glossary/c/chisqtest.php.)

ANOVA (Analysis of Variance). Techniques used to determine if differences between two or more groups are significant. This type of test is based on an assessment of the variation between groups relative to variation not associated with differences in group membership. (For further details see http://www.animatedsoftware.com/statglos/sg_anova.htm.)

3.4 Analytical Framework

For this project, the analytical approach focused on two types of analysis—basic descriptive analysis, and means testing. The basic descriptive analysis consisted of the following statistics: mean, median, mode, frequencies, range, and standard deviation. The means testing consisted of using chi-square and ANOVA tests.

The means tests showed statistically significant[1] differences among the jurisdictions. Jurisdictions were separated by certain characteristics, such as population size or whether the jurisdiction belonged to an MSA. These groupings, which represent subcomponents of the sample, allowed the research team to perform the means testing to compare the regulatory standards between regions within the sample, rather than the entire sample. Using these groupings allowed for comparisons that showed regional variation among the subcomponents of the sample. The subcomponents included:

[1] For the remainder of the report, "statistically significant" results will be denoted as "significant."

Government type. Jurisdictions were separated by six government types—county, city, town, township, village, and other government type. Counties and parishes were combined because there are few parishes, and they serve a similar function as counties. All the other government types were combined as well because they made up less than 3 percent of the governments in the study.

Census region. States were grouped into the four regions used by the U.S. Census: Northeast, Midwest, South, and West.[viii]

Part of an MSA. Jurisdictions were grouped by whether they are a part of a Metropolitan Statistical Area (MSA), as defined by the U.S. Census. Jurisdictions belonging to an MSA are more likely to be located in an area where the population is densely distributed.

Central city. Jurisdictions were grouped based on whether they are a central city, as defined by the U.S. Census. A central city is the largest city of a Metropolitan Area (MA) and is a basis for establishment of an MA. Jurisdictions that are a central city are typically more densely populated than jurisdictions that are not a central city.

Population. The sample jurisdictions were grouped into quartiles based on their populations from the 2000 U.S. Census. The groups were as follows: fewer than 5,491 people; 5,492 to 25,176 people; 25,177 to 97,268 people; and more than 97,268 people.[ix]

The means tests indicated whether sample subcomponents, such as government type or Census region, make a difference in the standards that jurisdictions establish. For example, the means testing tells whether a variable such as lot size is likely to be different if the government is a city or county or if it is located in the east or west, etc. The research team used two forms of means testing—chi-square and ANOVA.

The team performed chi-square tests on each variable using the five subcomponents of the sample. The chi-square indicated which variables had significant differences for the subcomponents of the sample. It is likely that significant differences were caused by differences in the variables for the subcomponents. In other words, if the chi-square for lot size by government type is significant, then it is likely that lot size varied in a significant pattern by government type.

The research team then performed an ANOVA test to identify which subcomponents had significant differences. Where the chi-square test can indicate a significant difference among all of the subcomponents, the ANOVA can show the significant differences between each of the subcomponents. For example, this test might show that lot sizes are statistically different in cities than in counties. Researchers performed this test for the government type, Census region, and population subcomponents.

In cases where the team found standards for the variables in fewer than 100 jurisdictions, it did not perform any means testing because there were too few data to produce meaningful results. Appendix A – Survey of Regulatory Standards includes additional details about statistical procedures.

3.5 Summary of Descriptive Analysis of Regulatory Standards

Table 3.1 below and the following general observations on the sample provide summary of descriptive statistics for the variables reviewed in the study.

Table 3.1: Summary of Descriptive Statistics of the Variables Reviewed

	N	Mean	Median	Mode	Standard Deviation	Minimum	Maximum
Lot size	419	9,924	6,000	5,000	16,946	750	217,800
Lot width	342	62	60	50	25	20	250
Front yard	413	25	25	25	13	0	100
Side yard	417	8	8	5	5	0	30
Rear yard	404	21	20	25	9	0	65
Minimum floor area	86	1,060	1,000	1,000	359	500	2,500
Off-street parking	367	2	2	2	1	0	4
Open space requirements							
Percent of total land in subdivision	47	13	10	10	9	3	50
Number of square feet per dwelling unit	18	1,562	795	871	3,447	310	15,246
Number of square feet per person	34	229	218	218	112	87	436
Sidewalk width	153	4	4	4	1	3	10
Planting strip width	37	5	5	5	1	2	8
Street pavement width	192	28	28	30	6	16	45
Street right-of-way width	262	52	50	50	8	20	80

Source: Study of Subdivision Requirements as a Regulatory Barrier to Affordable Housing, Descriptive Analysis, CPW 2006
Units are linear feet except minimum floor are in square feet

The statistical analysis led the research team to the following broad conclusions:

The sample is roughly representative of each state by population and geography. The sampling methodology was designed to draw a sample of jurisdictions based on the states' populations proportionate to the U.S. population. It was also designed to ensure geographic diversity by including a minimum of two jurisdictions per state, regardless of population. Jurisdictions in the sample represent 26 percent of the entire U.S. population.

Most of the 469 jurisdictions reviewed had zoning and subdivision ordinances. Ninety percent of the jurisdictions had a zoning ordinance and 86 percent had a subdivision ordinance. Six percent of the jurisdictions had neither a subdivision nor a zoning ordinance.

Lot size requirements were highly variable among jurisdictions. The smallest minimum lot size in the study was 750 square feet and the largest was 217,800 square feet (5 acres).

Forty-one percent of the jurisdictions in the sample had minimum lot sizes between 5,000 and 6,999 square feet. Statistical testing showed significant differences in lot size requirements for each subcomponent of the sample. For example, there were significant differences in minimum lot sizes for each of the four Census regions (one of the subcomponents of the sample), with larger minimum lot sizes in the Northeast than in the other three regions.

Lot widths varied across jurisdictions. The smallest lot width requirement was 20 feet, the largest was 250 feet, and the median was 60 feet. Fifty-five percent of jurisdictions required minimum lot widths of 50 to 69 feet. As with lot sizes, statistical testing showed significant differences in lot width requirements for each subcomponent of the sample.

The mean front set-back requirement was 25 feet. Fifty-six percent of jurisdictions had front setbacks between 20 and 29 feet. Like lot size and width, front setbacks differ in a significant way for each subcomponent of the sample.

The mean side set-back requirement was 8 feet per side. Fifty-eight percent of jurisdictions required minimum side yard setbacks of between 5 to 9 feet. Side setbacks differed in significant ways for each subcomponent of the sample.

The mean rear set-back was 21 feet. The smallest requirement for a rear set-back was zero feet and the largest was 65 feet. Fifty-five percent of jurisdictions required rear set-back of between 20 and 29 feet. Rear yard setbacks differed in significant ways for each of the five subcomponents of the sample, except for population quartiles.

Fewer than 20 percent of jurisdictions had minimum floor area requirements. For those jurisdictions that have such requirements, the mean floor area was 1,060 square feet and the median 1,000 square feet. The smallest floor area requirement was 500 square feet per dwelling unit and the largest 2,500 square feet.

More than three-quarters of the jurisdictions required two off-street parking spaces. The mean number of off-street parking spaces required per dwelling unit was 1.88 and the median was 2 parking spaces. Further statistical testing showed that the number of off-street parking spaces required differed in a statistically significant way based on population quartile, as well as between central cities and non-central cities.

Fewer than half of the jurisdictions had landscaping standards. Forty-two percent of the jurisdictions had landscaping standards specifically for subdivisions or the zoning district that were examined for the study. Differences in landscaping requirements are significant for the following subcomponents of the sample: Census region, if the jurisdiction is part of an MSA, and population quartile.

Twenty percent of jurisdictions had quantitative open space requirements. The research team collected three types of requirements for open space: (1) percent of total land in the subdivision; (2) number of square feet per dwelling unit; and (3) number of square feet per person. About 20 percent of the jurisdictions in the sample used at least one of these methods for determining open space requirements.

Fifty-one percent of all jurisdictions n the sample explicitly required sidewalks. Of those jurisdictions, 51 percent (e.g., about one-quarter of all jurisdictions in the sample) required sidewalks on both sides of the street. The average sidewalk width was 4 feet. Requirements for sidewalks varied systematically by the following subcomponents of the sample: government type; membership in an MSA; and the jurisdiction's population. In contrast, sidewalk width requirements did not vary systematically based on any of the subcomponents of the sample.

Relatively few (8%) jurisdictions had requirements for planting strips. The planting strip is a landscaped area between the sidewalk and curb. The mean and median planting strip width was 5 feet.

Curbs and gutters were required by 50 percent of the jurisdictions in the study.

The mean and median pavement width for streets was 28 feet. Most jurisdictions' standards for pavement width were either from 20 to 24 feet wide, from 25 to 29 feet wide, or from 30 to 34 feet wide. Pavement width differed in a statistically significant way for each subcomponent of the sample.

The mean street right-of-way was 52 feet. Fifty-six percent of jurisdictions with right-of-way standards require right-of-ways no smaller than 50 to 54 feet; and 24 percent of jurisdictions require right-of-ways at least 60 to 64 feet wide. Street right-of-way requirements vary systematically by Census region.

3.6 Summary of Means Testing Of Regulatory Standards

The results of means testing, including chi-square and ANOVA tests, are summarized by variable below. Table 3.2 shows a summary of the results of the chi-square tests. Statistically significant results are denoted with a star (*). A significance level of less than 0.05 is considered significant.

A statistically significant result means that it is highly probable that there is a difference within the subcomponent for the variable. For instance, off-street parking requirements are only statistically significant for central city and population. That means that off-street parking requirements are different for jurisdictions that are a central city and jurisdictions that are not a

central city. Likewise, off-street parking standards are different for jurisdictions with different sized populations.

Table 3.2: Summary of Means Testing for Variance within Five Subcomponents of the Sample

	Government type	Census region	Part of MSA	Central city	Population
Lot size	0.000*	0.000*	0.000*	0.000*	0.000*
Lot width	0.000*	0.000*	0.000*	0.000*	0.000*
Front yard	0.000*	0.000*	0.000*	0.000*	0.000*
Side yard	0.000*	0.000*	0.000*	0.000*	0.000*
Rear yard	0.007*	0.000*	0.001*	0.029*	0.055
Off-street parking	0.804	0.556	0.622	0.000*	0.011*
Open space requirement	0.216	0.003*	0.058	0.460	0.200
Landscaping requirement	0.054	0.002*	0.018*	0.783	0.000*
Sidewalk required	0.007*	0.096	0.000*	0.143	0.001*
Sidewalk width	0.841	0.060	0.565	0.156	0.251
Street pavement width	0.001*	0.000*	0.050*	0.046*	0.021*
Street right-of-way width	0.903	0.000*	0.233	0.323	0.387

Source: Study of Subdivision Requirements as a Regulatory Barrier to Affordable Housing, Descriptive Analysis, CPW 2006. Calculations by ECONorthwest.

Note: Statistically significant results are noted with an star (*) for p < .05.

The means tests led the research team to the following broad conclusions:

Lot size requirements were statistically significant for all subcomponents of the sample. Table 3.2 shows that lot size requirements were significantly different for each subcomponent of the sample. For example, lot size requirements were different based on the jurisdiction's type of government or whether the jurisdictions was within an MSA.

Further statistical testing showed the differences in lot sizes among subcomponents of the sample.[2] Lot size varied within each subcomponent in the following ways:

Government type: City lot sizes were significantly smaller than county, town, and township lot sizes.

Census region: Lot sizes in the Northeast were statistically larger than lot sizes in the other three regions.

Population: Lot sizes in the first quartile, jurisdictions with the fewest people, were statistically larger than lot sizes in other quartiles.

[2] This form of statistical testing, an ANOVA, required a minimum of three groups within the subcomponent. The project team conducted this test for the government type, Census region, and population subcomponents.

The differences observed within both types of means testing reinforce the conclusion that statistical differences resulted from differences in lot size within the subcomponents.

Lot width requirements were statistically significant for all subcomponents of the sample. Table 3.2 shows that lot width requirements were significantly different for each subcomponent of the sample. For example, jurisdictions located in different Census regions had significantly different lot width requirements. Further statistical testing showed that lot width varied in the following ways:

> **Government type:** Lot widths were statistically different between the following groups—cities had smaller average lot widths than villages, towns, or townships; and counties had larger average lot widths than towns or townships.
>
> **Census region:** Lot widths were statistically different between the Northeast and all other regions. The Northeast had larger average lot widths than any other region. Lot widths in the Midwest were statistically larger than those in the West.
>
> **Population:** Lot widths were statistically different between the first population quartile, jurisdictions with the fewest people, and the other quartiles. The first quartile had larger average lot widths than the other quartiles. In addition, the second quartile had significantly larger lot widths than the fourth quartile.

The differences observed within both types of means testing reinforce the conclusion that statistical differences resulted from differences in lot width within the subcomponents.

Front yard requirements were statistically significant for all subcomponents of the sample. Table 3.2 shows that front yard requirements were significantly different for each subcomponent of the sample. Further statistical testing showed that front yard requirements varied in the following ways:

> **Government type:** Front setbacks were statistically different for the following groups—counties had smaller average front setbacks than townships; and cities had smaller average front setbacks than towns, townships, and villages.
>
> **Census region:** The West had statistically smaller average front setbacks than any other region. The South had statistically smaller average front setbacks than the Midwest and Northeast.

The differences observed within both types of means testing reinforce the conclusion that the statistical differences result from fundamental differences in front setbacks within the subcomponents.

Side yard requirements were significant for all subcomponents of the sample. Table 3.2 shows that side yard requirements were significantly different for each subcomponent of the sample. Further statistical testing showed that side yard requirements varied in the following ways:

> **Government type:** Side setbacks are statistically different for the following groups—counties have smaller average front setbacks than towns and townships; and cities have smaller average front setbacks than towns, townships, and villages.
>
> **Census region:** The Northeast has larger average side setbacks, a significant difference between the Northeast and the other regions. The West has smaller average side setbacks than any other region, which is also significant.
>
> **Population:** The first population quartile—jurisdictions with the fewest people—have larger average side setbacks, which is significantly different from each other quartile. Likewise, the second population quartile has larger average side setbacks than the third and fourth quartiles, which is also significant.

The differences observed within both types of means testing reinforce the conclusion that the statistical differences resulted from fundamental differences in side yard requirements within the subcomponents.

Rear yard requirements were significantly different for most subcomponents of the sample. Table 3.2 shows that rear yard requirements were statistically significant for each subcomponent except population. Further statistical testing showed that side yard requirements varied in the following ways:

> **Government type:** Rear setbacks were on average smaller in counties than townships, a significant difference. Cities had smaller average rear setbacks than towns and townships.
>
> **Census region:** The West had significantly different re0ar setbacks, which were generally smaller than the other regions. The South's rear setbacks were also statistically different from other regions. The South had larger rear setbacks than the West and smaller rear setbacks than the Northeast or Midwest.
>
> **Population:** Jurisdictions in the fourth quartile of population (having the largest populations) had smaller average setbacks than any other quartile. This difference was significant between the fourth quartile and the first and second quartiles.

The differences observed within both types of means testing reinforce the conclusion that the statistical differences resulted from fundamental differences in rear yard requirements within the subcomponents.

Off-street parking requirements varied significantly for two subcomponents of the sample. Table 3.2 shows that off-street parking requirements were significantly different within the central city and population subcomponents. In other words, the number of off-street parking spaces required varied, depending on whether the jurisdiction was a central city and the amount of population the jurisdiction had.

Additional statistical testing showed that off-street parking requirements varied for the population subcomponent. Jurisdictions in the fourth quartile of population (having the largest populations) require less off-street parking than jurisdictions in the second population quartile. This result reinforces the conclusion that the statistical differences resulted from fundamental differences in off-street parking requirements within population quartiles.

Open space requirements varied significantly among Census regions. Table 3.2 shows that open space requirements only varied significantly among Census regions. For example, whether a jurisdiction required open space or not was not significantly different for jurisdictions located in a central city and those not within a central city. The research team did not perform further tests for open space because open space had only two possible values (yes or no) and the ANOVA test requires three or more possible values (i.e., yes, no, maybe).

Landscaping requirements varied significantly for some subcomponents. Landscaping requirements varied significantly for the following subcomponents—Census region, membership in an MSA, and population. For example, landscaping requirements varied significantly based on whether the jurisdiction was part of an MSA or not. The research team did not perform further tests for landscaping because landscaping had only two possible values (yes or no) and the ANOVA test requires three or more possible values (i.e., yes, no, maybe).

Sidewalk requirements varied significantly for some subcomponents but sidewalk width requirements did not vary significantly for any subcomponent. Whether a jurisdiction required a sidewalk varied significantly among the following subcomponents—government type, membership in an MSA, and population. The research team did not perform further tests for sidewalk requirements because it had only two possible values (yes or no) and the ANOVA test requires three or more possible values (i.e., yes, no, maybe).

Sidewalk width requirements did not vary significantly by any subcomponent of the sample, which is consistent with the findings shown in Table 3.2 that sidewalk widths had little variation.

Street pavement width varied significantly for each subcomponent of the sample. Table 3.2 shows that street pavement widths varied significantly for all subcomponents. For instance, street pavement requirements were significantly different for the Census regions, with jurisdictions in some regions requiring wider pavement widths than in other regions.

Additional statistical testing showed differences in pavement widths within subcomponents of the sample. The tests showed differences within government type and Census region, indicating that pavement widths varied significantly by government type and Census region. Although the chi-square statistical test indicated that pavement widths were statistically different among population quartiles, additional statistical testing indicated that there are no significant differences in pavement widths for population quartiles. Pavement widths varied within each subcomponent in the following ways:

> **Government type:** Cities had the largest average pavement widths of any government type. This difference in pavement widths was significant between cities and towns.
>
> **Census region:** Pavement widths were statistically different between the West and the Northeast and South. The West had larger average pavement widths.
>
> **Population:** There were no significant differences in pavement widths when analyzed by population quartiles.

The differences observed within both types of means testing reinforce the conclusion that the statistical differences resulted from fundamental differences in pavement width requirements within the subcomponents.

Street right-of-way width varied significantly among Census regions. Table 3.2 shows that right-of-way widths only varied significantly among Census regions. Additional statistical testing shows that street right-of-way widths were statistically different between the Midwest and all other regions. The Midwest had larger average right-of-way widths than the other regions. This result reinforces the conclusion that the statistical differences resulted from fundamental differences in right-of-way widths within Census regions

4. Standards, Benchmarks, and Unit Costs

The research team assumed that an SFD dwelling developed in conformance with appropriate land and site development standards for the protection of public health and safety would be characterized by a minimum benchmark set of land development standards for lot size, floor space requirements, lot width, etc. The benchmark standards are based on 12 individuals responding to a survey of 25 land development professionals including residential land developers, civil engineers, architects, land planners in private practice, and land planners employed by planning jurisdictions. The individuals solicited in the survey were recommended by the National Association of Home Builders (NAHB) and the National Association of Counties (NACo).

4.1 Benchmarks

The benchmark standards in Tables 4.1 and 4.2 were set at the mean value of the benchmark values suggested by the 12 respondents to the survey described above. The respondents were asked to submit benchmark standards appropriate to geographic areas with "more dense" development. The more dense development scenario was defined as a median lot size of 7,000 square feet or 0.16 acre.

[x] These benchmarks were used for comparison with jurisdiction requirements for Metropolitan Statistical Areas (MSA). Separate standards were solicited for communities with "less dense" development. The "less dense" development scenario was described as a community with a median lot area of 22,000 square feet or 0.50 acre.[xi] These benchmarks were used for comparison with jurisdiction requirements outside Metropolitan Statistical Areas (non-MSA).

Table 4.1: Expert Responses for Land Development Benchmarks for "More Dense" Development, Statistical Summary of Responses Used for Comparison in MSAs (N=12)

Land Development Standard	Mean	Minimum	Maximum
Lot size (feet) [2]	4,250	2,750	7,000
Lot widths (feet)	39	30	60
Front, side, and rear setbacks			
FRONT (feet)	13	0	30
SIDE (feet)	5	3.5	6
REAR (feet)	16	10	30
Floor area minimums (feet) [2]	981	400	1,750
Paved roadway width (feet)			
On-street parking allowed one side only	24	21	28
On-street parking allowed on both sides	27	22.5	32
Width of planting strip required (feet)	5.1	3.5	10
Sidewalk width (feet)	3.94	3	5
Number of off-street parking places required	1.56	1	2
Open space requirements (% of total land in subdivision)	12.9	0	40

Table 4.2: Expert Responses for Land Development Benchmarks for "Less Dense" Development, Statistical Summary of Responses Used for Comparison in MSAs (N=8)

Land Development Standard	Mean	Minimum	Maximum
Lot size (feet) [2]	9,411	3,200	20,000
Lot widths (feet)	54	20.0	90
Front, side, and rear setbacks			
FRONT (feet)	19	0.0	35
SIDE (feet)	8	0.0	20
REAR (feet)	21	10	50
Floor area (feet)[2]	1,481	800	2,500
Paved roadway width (feet)			
On-street parking allowed one side only	23	20	28
On-street parking allowed both sides	28	22.5	36
Width of planting strip required (feet)	6.1	3.5	10
Sidewalk width (feet)	3.93	3	5
Curb and Gutter drainage			7 out of 8 respondents indicate swales/ drainage ditches should be considered for alternate drainage
Number of off-street parking places required	1.6	1	2
Should required parking be under cover?			consensus of 7 out of 8 respondents : No
Open space requirements (% of total land in subdivision)	11.5	4.0	25.0

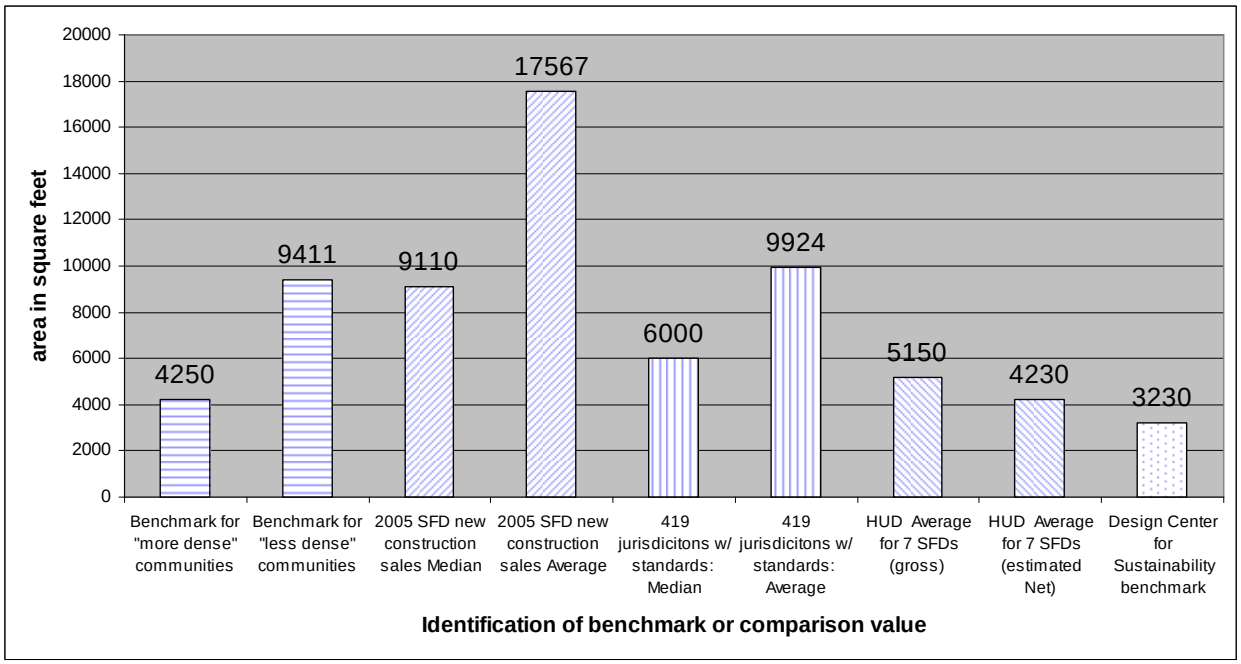
As expected, the expert survey result for the benchmark lot sizes, lot widths, minimum front, rear, and side setbacks, and for minimum square foot floor areas are all significantly smaller for the "more dense" population scenario as compared with the "less dense" population scenario. This reflects that a more compact development pattern is generally followed in more urbanized locations.

Costs to a homebuyer for developed lots which conform to the benchmark standards will be lower in general as compared to developed lots with larger lot areas, frontage widths, and interior floor space. The cost differential between a lot developed according to the benchmark standards and the more common larger lot sizes and dwelling characteristics seen in existing residential subdivisions are classified as a regulatory cost barrier in this report. Notwithstanding this designation, larger, wider lots with larger interior floor space are considered more desirable single-family homes to many potential homebuyers who would be willing to pay more for these dwellings as compared with a benchmark lot and dwelling. The requirement for large, wide lots and large interior floor space is an actual cost barrier to the home buyer who has the resources to afford a home developed according to the benchmark standards but is less able to afford a home developed according to the larger and more costly standards adopted by many planning jurisdictions.

4.1.1 Lot Size

The average benchmark value for lot size developed by the expert panel was 4,250 square feet for "more dense" communities, and 9,411 square feet for "less dense" communities (see figure 4.1). As can be seen, the "required lot sizes", i.e., the median zoned lot sizes for the "more dense" and the "less dense" communities—7000 square feet and 22,000 square feet, respectively—were both significantly in excess of the benchmarks used for these communities. In the more dense communities, required lot sizes were sixty-five percent (65%) greater than the benchmark standard; in the less dense communities,required lot sizes were over 200% greater than the benchmark standard.

Figure 4.1: Lot Area Comparison of Benchmarks to Reference Values



The U.S. Census Survey of Construction classifies new SFD homes in the following categories of lot size—under 7,000 square feet; 7,000 to 9,000 square feet; 9,000 to 11,000 square feet; 11,000 to 22,000 square feet; and over 22,000 square feet. On a national basis, including 2005 sales in all price ranges, 29 percent of sales fell in the category which included the benchmark value for "more dense" communities—less than 7,000 square feet. The applicable percentages for the other lot size categories for 2005 sales were 19 percent for 7,000 to 9,000 square feet, 17 percent for 9,000 to 11,000 square feet, 22 percent for 11,000 to 22,000 square feet, and 13 percent for over 22,000 square feet.[xii] The median lot size for 2005 sales of SFD homes in the United States was 9,110 square feet and the average lot size was 17,567 square feet.

These values for the benchmark lot sizes show the same trend to larger minimum lot sizes in "less dense" communities as is noted in the statistical characteristics for lot size in the survey of existing regulations—planning jurisdictions in non-MSAs had significantly larger minimum lot size requirements than jurisdictions located in MSAs.

The benchmark minimum lot size for "more dense" communities is 28 percent smaller (1,750 square feet)than the median lot size standard of 6,000 square feet for the 419 jurisdictions with standards listed in Table 3.1 The benchmark minimum lot size standard of 4,250 square feet in "more dense" communities is larger than existing minimum lot size standards in 37 of the 419

jurisdictions with lot size standards—only 37 jurisdictions had lot size standards of less than 4,000 square feet. The 4,250 square foot benchmark is smaller than lot size standards in 348 of the 419 jurisdictions with standards. Those 348 jurisdictions had standards which were 5,000 square feet or greater. Thirty jurisdictions (seven percent of the 419 with standards) are in the range that includes the benchmark standard (4,000-5,000 square feet). Because the "benchmark" lot size for "more dense" communities is considerably smaller than the median and the mean lot size requirements on a national basis, land planning jurisdictions require on average 2000-6000 square feet more than the benchmark and at a national average raw land cost of about $2 per square foot, this is a regulatory cost barrier of $4000 -12000 for lot size alone.

The benchmark lot size of 9,411 square feet for "less dense" communities is very close to the mean minimum lot size of 9,924 square feet for the 419 jurisdictions in the sample which had standards for lot area. The median value for the lot sizes for new SFD home sales nationally in the U.S. Census of Construction for 2005 was about 3 percent less than the 9,411 square foot benchmark.

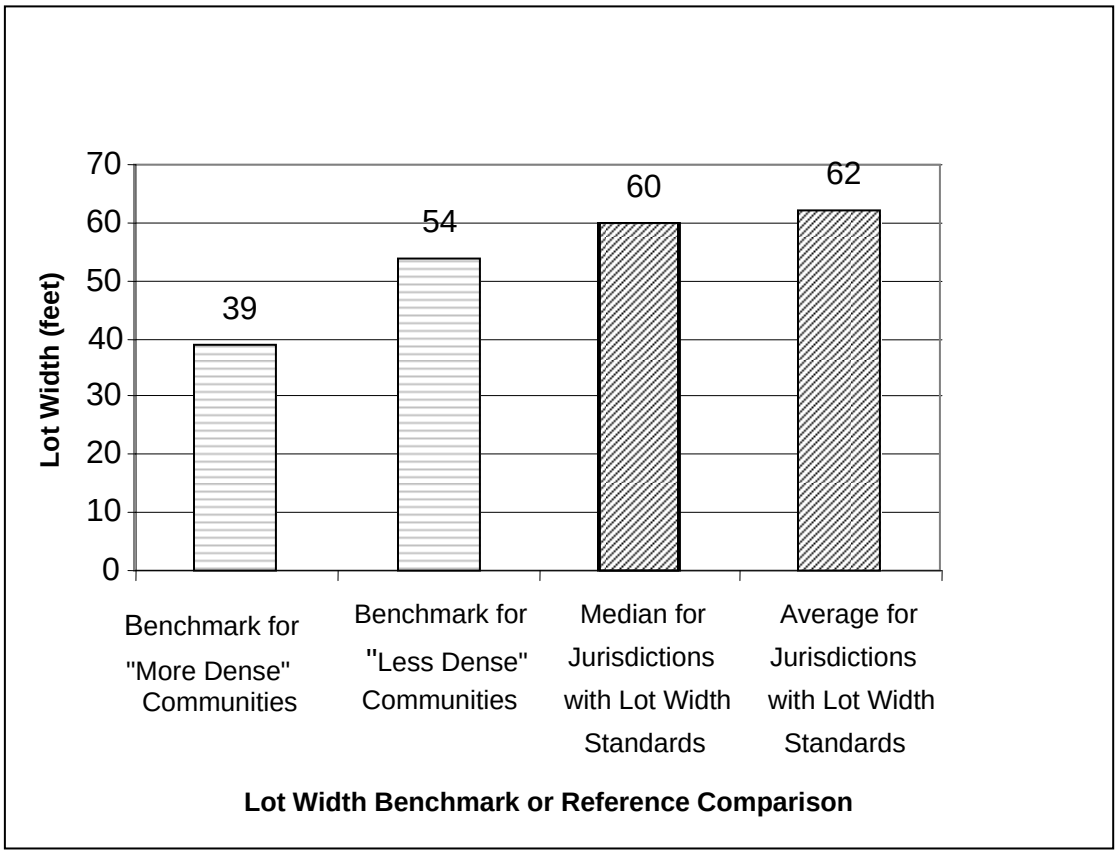
Of the seven SFD developments listed in the HUD web-based resource "Affordable Housing Design Advisor,"[xiii] the number of dwelling units per acre ranged from 5 to 16 with an average of 8.4 (gross area of 5,150 square feet per unit). The actual average lot size for those seven SFD developments will be smaller than 5,150 square feet since the number of units per acre density includes the roadway areas serving 8.4 lots. Assuming 40-foot lot frontages, a 50-foot right of way, and a 26-foot wide road, the road area would occupy about 18 percent of the total area, leaving each lot with an area of approximately 4,230 square feet. This is very close to the "benchmark" standard for "more dense" communities developed by the research team, which lends independent support for the benchmark used in this study.

An even smaller lot size standard that the average lot size based on the seven SFD developments referenced above has been suggested as a means of reducing the costs of developed lots by the Design Center for Sustainability at the University of British Columbia (Canada). They recommended decreasing in the minimum residential single family detached building lot size from a current standard of 7,247 square feet to 3,230 square feet, a standard which was adopted in a neighboring community.[xiv]

4.1.2 Lot Width

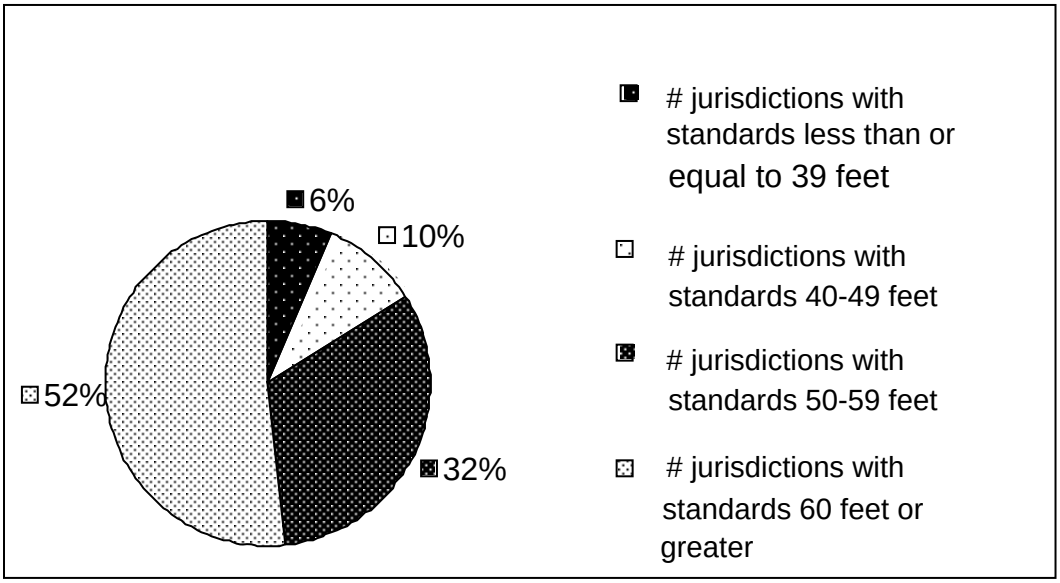
The benchmark lot width of 39 feet in "more dense" communities is 65 percent of the median lot width of 60 feet listed in Table 3.1 for the 342 jurisdictions which had minimum lot width standards (see Figure 4.2).

Figure 4.2: Benchmarks for Lot Width Compared with Reference Values



The benchmark lot width of 54 feet in "less dense" communities is 90 percent of the median lot width in the 342 jurisdictions with lot width standards. Of those jurisdictions, 6.4 percent (22) had standards equal to or lower than the 39-foot benchmark for "more dense" communities and 93.6 percent (320) had lot-width standards greater than this benchmark (Figure 4.3).

Figure 4.3: Jurisdictions with Standards for Lot Width in Width Ranges as a Percentage of Total Jurisdictions with Standards (342)



In comparison with the 54-foot lot width benchmark for "less dense" communities, 110 of 342 jurisdictions (32%) had standards within the range of 50 to 60 feet, more than any other 10-foot width increment range. Fifty-five jurisdictions (16%) had lot width standards smaller than 50 feet; 177 jurisdictions (52%) had standards that were 60 feet or greater.

Lot widths of 40 feet or smaller have been proposed by a number of jurisdictions in conjunction with "zero lot line" zoning. This is a placement of house with the edge of the building coincident with one of the lot lines. The single side yard extends from each dwelling to the lot line on the opposite side. This configuration of house and side yard preserves a sense of private open space for narrow lots.[xv]

4.1.3 Setbacks

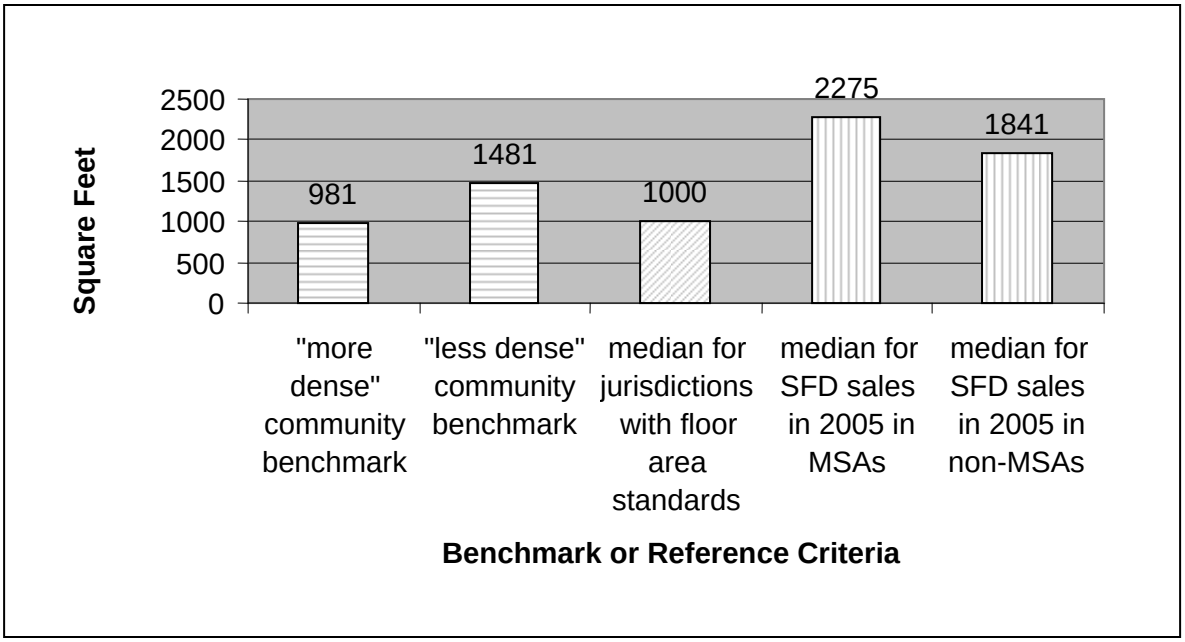
The average value for the benchmark front setback is 13 feet in "more dense" communities and 19 feet in less dense communities. Of the 419 jurisdictions in the sample with front setback standards, 9 percent were 14 feet or less, 80 percent were 20 feet or more, and 11 percent were in the range of 14 to 20 feet. The range of the benchmarks for "more dense" communities was 0 to 30 feet, and 0 to 35 feet for "less dense" communities. In the range of 13 to 19 feet, approximately one car length can be accommodated between the street and the front of the dwelling. If the driveway were 16 feet wide, then two vehicles could comfortably be accommodated side by side. At the high end of the benchmark range, two vehicles may be accommodated end to end between the dwelling and the street.

A number of planning jurisdictions have adopted reduced setbacks to reduce the cost of lot development. In its affordable housing overlay district, the front setback for the San Louis Obispo, California planning jurisdiction is 18 feet.

4.1.4 Floor Area Minimums

The benchmark floor area minimums of 981 square feet in MSAs and 1,481 square feet in non-MSAs are both significantly smaller than the median national interior floor areas for construction of single-family detached dwellings in 2005—2,275 square feet for MSAs and 1,841 square feet for non-MSAs (Figure 4.4).[xvi] Interestingly, the 981-square foot average benchmark value of minimum floor area for "more dense" communities is very close to the 1,000-square foot median value for the floor area required in the 86 out of 469 jurisdictions with standards for interior floor area.

Figure 4.4: Interior Floor Space Benchmarks and Reference Criteria



Of reported sales of 2005 new SFD homes in the United States, 2 percent of interior floor areas fell in the range of the benchmark standards for MSA areas—less than 1,200 square feet floor area. Thirteen percent of those homes fell in the range that includes the non-MSA benchmark interior floor area—1,200 to 1,600 square feet. Most sales fell in larger size ranges for floor areas—19 percent in the range 1,600 to 2,000 square feet; 19 percent in the range or 2,000 to 2,400 square feet; 22 percent in the range of 2,400 to 3,000 square feet; and 25 percent greater than 3,000 square feet.[xvii]

4.1.5 Road Widths

The average value of the benchmark standard for paved street width for streets with parking restricted to one side only in "more dense" communities is 24 feet. For streets with parking on both sides of street, the benchmark standard is 27 feet. For "less dense" communities, the average benchmark is 23 feet for parking on one side only and 28 feet for parking allowed on both sides. The difference between 23 feet "more dense" communities and 24 feet "less dense" communities for one side only parking is not statistically significant given the small sample size. Also not significant for the same reason is the difference between 27 feet in "more dense" communities" and 28 feet in "less dense" communities for both sides of street parking.

The average value of the benchmark standard for paved street width for streets with parking restricted to one side only in "more dense" communities is 24 feet. For streets with parking on both sides of street, the benchmark standard is 27 feet. For "less dense" communities, the average benchmark is 23 feet for parking on one side only and 28 feet for parking allowed on both sides. In the database of existing regulations, the average required street width is 28 feet and the most frequent street width requirement, the mode, is 30 feet. The required minimum road widths based on the survey of existing regulations were in the range of 20 to 24 feet for 55 out of the 192 (29%) jurisdictions with road width standards. Road widths of 25 to 29 feet were required by 53 jurisdictions (28%) with road width standards.

The NAHB Research Center (1993) provides guidance for required road widths. For access roads with estimated vehicular traffic of 0 to 250 average trips per day, and a maximum posted speed of 20 miles per hour, with both on-street and off-street parking, the listed range of minimum acceptable street widths is 18 to 22 feet. For the larger sub-collector streets with both on- and off-street parking, the listed minimum paved width is 26 to 28 feet.

A standard 32-foot wide paved street with parking on both sides of the street will typically have a 7-foot wide lane on each side for parking and two 9-foot wide travel lanes. Under traditional design standards, where parking is restricted to one side of the street, the parking lane may have a width of 8 feet with two 10-foot wide travel lanes, for a total width of 28 feet.

Street widths can be reduced by using parking lanes as "queuing" lanes. For example, a 26-foot wide street with parking allowed on both sides of the street may have two queuing lanes and a single travel lane. The travel lane would typically be 12 feet wide with each queuing lane at 7 feet wide. Cars need to move from the travel lane into the opposite queuing lanes as two vehicles pass each other. For parking restricted to one side only, the use of a 7-foot wide queuing lane and a 13-foot wide travel lane for a total width of 20 feet is recommend to minimize street widths (NAHB Research Center, 2003). Suggested street width standards in these subdivision design guides generally reference the need to consider the wheelbase and turning requirements of fire and emergency equipment that will serve the development.

Current trends for the reduction of development impacts to the water or hydrologic cycle, known as "low impact development," emphasize the benefits of reducing paved road surfaces as a means of reducing stormwater runoff amounts. The Seattle Department of Public Works (2005) pioneered a low impact development residential access road design with a paved width of 14 feet. All parking is off-street in this area. The design includes 2-foot flat concrete curbs on each side for a total width of 18 feet from the outside edge of curbing to the outside edge of opposite curbing. Besides cost savings on actual paving, the quantity of stormwater runoff is reduced due to less paved surface and having all drainage flow off the curbing into grass drainage swales, eliminating the need for more costly curb and gutter drainage.

4.1.6 Sidewalks

The benchmark survey for this study indicated a consensus that alternative pedestrian paths could be utilized and that sidewalks should not be required in "less dense" communities. This is the benchmark used to compare requirements in non-MSA jurisdictions.

4.1.7 Open Space

The average benchmarks for required minimum amounts of open space are 12.9 percent of the total subdivision area for "more dense" communities and 11.5 percent of the subdivision area for "less dense" communities. For the 47 out of 133 jurisdictions with open space requirements based on a percentage of land area in the subdivision, the mean value was 13 percent. The majority (60%) of the jurisdictions with standards for open space had requirements in the range of 10 to 19 percent. About one-fifth of the jurisdictions with standards for open space had higher requirements for open space and approximately the same percentage had lower requirements for open space.

Much higher open space requirements are generally applied to "open space conservation subdivisions," also known as "cluster" subdivisions, as compared with standard lot layout subdivisions. In the cluster design, the allowable number of dwellings on the parcel being subdivided is often set at the number of dwellings that could be constructed at the underlying zoning density. The dwellings are placed on the parcel in a manner to maximize the percent of undeveloped land, usually in the range of 40 to 60 percent, while the lot size for each dwelling is reduced proportionately.

4.2 Unit Costs and Regulatory Cost Barriers

The research team for this study compared the individual jurisdiction land development standards (lot size, lot width, etc.) with benchmark values for those standards. Where the requirements of the individual land development standard contained in a jurisdiction's

subdivision rules or zoning ordinances exceed the benchmarks, a regulatory cost barrier was estimated using raw land costs together with data taken from the *2005 R.S. Means Site Work and Landscape Cost Data* manual and the *2005 RS Means Residential Cost Data* manual.

The team quantified the incremental unit costs for both raw land and for additional infrastructure such as road paving, lengths of storm sewer pipe, sanitary sewer pipe, and water supply piping within a subdivision. These individual cost estimation methods are presented below for each land development or site development standard considered.[xviii]

4.2.1 Lot Size

Due to the high cost of land in MSAs, especially in the Northeast and West U.S. Census regions, the cost differential for building lot sizes larger than the benchmark lot standards can be significant. It is not completely straightforward to attribute a fixed cost of the lot per square foot because the per-square-foot cost of land will generally be lower for larger lots. Within a jurisdiction, the per-square-foot cost of a buildable lot will be a function of the required area for the minimum lot size. If the requirements are changed, there could be a direct effect on the cost of lots on a square-foot basis.

One particular concern for the research team was obtaining a credible source of data to estimate the unit cost of the raw land in order to quantify the lot size cost barrier. Land costs vary on a smaller spatial scale than that of the easily available data on averages for finished lot costs and lot sizes from U.S. Bureau of Census, while costs for finished building lots vary significantly between neighboring communities. ,The building lot cost averages used by the research team were from very large geographic regions of the United States, as summarized by the U.S. Census of Residential Construction for the following census regions: Northeast, South, Midwest, and West. The costs are broken down as to lots located in MSAs and lots located in non-MSAs.

The team used these average costs and average lot sizes from U.S. Census Bureau data with the understanding and anticipation that if more accurate and representative local data were required for a specific jurisdiction, those local costs, if available from local sources of land sale records, could be substituted for the average land costs used in this chapter.

The data are based on responses to the 2005 U.S. Census of Residential Construction survey. The data from this survey serve as the basis of average costs for residential building lots and average lot sizes for 2004 annual recorded sales in each of the four U.S. Census regions (see Appendix B – Methods for Unit Infrastructure Costing).

The U.S. Census of Residential Construction survey asks builders what they paid for the lot that was permitted for construction in 2004. If this lot was bought several years prior to construction, land prices would generally have been lower at that time.

For the purpose of this research, the lot costs were modified by a factor of 50 percent to represent a national average for the ratio of the raw land cost to the finished lot cost (Carliner, 2006). Carliner used builder-supplied data from all four major U.S. Census regions to estimate the breakdown of raw land versus development costs for building lots.

For each of the 469 jurisdictions in the database, the average raw land cost to the builder per square foot (2005 costs) was estimated separately for each of the four major U.S. Census regions and either MSAs or non-MSAs based on the following quantities:

A. Average cost of SFD building lots
B. Percentage of the cost of the lot attributed to raw land (50%)
C. Average size of the single-family dwelling building lots

The average raw land cost per square foot is set at the *product* of the lot price A, *multiplied by* 50 percent, then *divided by* the lot area C.

These average raw land costs calculated using the method referenced above are presented in Table 4.3.

Table 4.3: Estimated Raw Land Costs by U.S. Bureau of Census Region

	2004 Average Raw Land Cost (per square foot) (Inflated to 2005 $)				
	Northeast	**Midwest**	**South**	**West**	**National**
Metro	$1.61	$1.55	$1.74	$4.36	$2.22
Non-Metro	$0.87	$0.80	$0.85	$1.80	$1.05

For each jurisdiction with a lot area requirement greater than the benchmark, the research team estimated the regulatory cost barrier for required lot sizes greater 4,250 square feet for MSA areas and 9,963 square feet for non-MSAs listed in Tables 4.1 and 4.2. For example, if the jurisdiction is located in an MSA in the Northeast Census region, and the jurisdiction minimum lot size is 1,000 square feet greater than the benchmark, the regulatory cost barrier due to the lot size regulation is estimated at $1.61 per square foot *multiplied by* 1,000 square feet, which equals $1,610.

Infrastructure and land development costs vary somewhat from region to region due to differing costs for labor but the material costs do not vary significantly. The jurisdictions in the West U.S. Census region MSAs have the highest finished lot costs, and the estimation method

indicates they have the highest raw land costs, as well. Conversely, in the Midwest U.S. Census region non-MSAs, the land costs are much lower than the national average.

Once the team determined the aggregate cost barrier for excess raw land requirements for the entire United States, it weighted the average raw land regulatory cost barrier for each of the four Census regions and MSA or non-MSA by the annual numbers of housing starts within that area, and then *summed* the results from each region and area. It should be noted that the spatial scale of available land cost data is at a gross level and is not conclusive as to whether or not the housing starts are evenly distributed across areas within a Census region/MSA area that have lower than average, average, or greater than average land costs. If the actual number of housing starts that occur within higher-than-average cost neighborhoods is greater that the number of housing starts in neighborhoods with below-average land costs, then the estimated aggregate Census region/MSA area regulatory cost barrier for excess lot size requirements will be skewed on the low side.

4.2.1.1 Use of Localized Land Costs

For more locally accurate estimates of the regulatory cost barrier due to lot size requirements greater than the benchmarks, it would be necessary to use locally appropriate building lot costs. To address that possibility the research team developed a template for a regulatory barrier costing (RBC) tool that could be made available to users over the Internet. As of this date the tool has not been verified. The use of the tool can not be recommended until this verification has taken place.[xix]

The RCB tool would allow the user to input locally relevant cost factors such as land costs. The user is asked to supply the local jurisdiction's requirements for the various standards utilized by the research team in developing the regulatory barrier cost analysis—lot size, lot width, street width (including whether or not one side or both side parking is permitted), front setback distance, interior floor space requirements, sidewalk requirements, off-street parking requirements, and open space requirements.

The RBC tool also provides user input options for unit infrastructure costs where the user wishes to modify the assumptions used by the research team. The tool would then perform the set of calculations used by the research team in Section 5.0 of this report to estimate the regulatory cost barriers for each of the land planning jurisdictions in the database used for the current study. The RBC tool would calculate the regulatory cost barrier for each land development requirement and would sum all costs to show the aggregate or total regulatory cost barrier. The RCB tool would provide an option for sharing the results with the administrator of a database containing all shared responses. An Excel file prototype for this tool is included in Appendix G.

4.2.2 Minimum Square Footage Dwelling Requirements

Where the planning jurisdiction required a minimum square foot floor area that is larger than the benchmark standards of 981(MSA) to 1,481 (non-MSA) square feet listed in Tables 4.1 and 4.2, a regulatory cost barrier was calculated. The unit cost factor for square foot floor area requirements greater than the benchmark standards was estimated to be $74.60 per square foot. This cost is based on an average of the costs for various sizes and qualities of slab-on-grade structures, and is based on combinations of siding and framing types for economy grade and average grade slab foundation houses.[xx]

According to the 2005 U.S. Census of Construction, 14 percent of all new single-family dwellings had reported costs for construction per square foot in the category that includes the value selected for this project—$70-80 per square foot.[xxi] For all new detached house sales in the United States in 2005, the median cost of construction per square foot is $82.59.[xxii]

The regulatory cost barrier for excess floor area requirements is equal to the *difference* between the jurisdiction-required interior floor area square foot space and the benchmark square foot area, *multiplied by* the residential unit construction cost factor. As an example, if the jurisdiction requires a minimum square foot floor area that is 100 square feet greater than the benchmark, the regulatory cost barrier for this requirement is estimated at $74.60 per square feet *multiplied by* 100 square feet, which *equals* $7,460.

4.2.3 Lot Width

If a planning jurisdiction requires a minimum lot width, or street frontage, larger than the benchmark widths of 39 feet (MSA) or 54 feet (non-MSA), the research team calculated a regulatory cost barrier. The greater costs are due to the requirement for construction of the additional length of street, the additional land for the longer street, and the associated infrastructure within the street as compared with the benchmark lot width.

Lot width is a significant determinant of total land improvement costs because the most expensive site improvements (i.e., roads, sewer, and water) cost proportionately more as the required length of street frontage for each lot increases. The requirement by a planning jurisdiction for greater than the benchmark lot widths listed in Tables 4.1 and 4.2 will cost the subdivision developer more for both the land and the paving required for longer streets. If the required lot widths are 50 percent greater than the benchmark widths, the street length required for a given number of fronting lots will be 50 percent longer than for lots which utilize the benchmark widths. The length of the sanitary sewer, storm sewer, water main, and other utilities which run in easements within the right-of-way associated with the street will also be

increased in proportion to the road length. Sewer and water supply connection fees are generally based on the length of the street frontage for each property being connected.

The aggregate unit costs for road construction for a given length of roadway depends on the required width of the roadway. For a typical subdivision access roadway width of 28 feet, which is the median value for the jurisdictions sampled, using national average cost estimates for sanitary sewer, storm sewer, water main, and 4- foot concrete sidewalks, and using national average MSA land costs, the unit cost for excess lot width is approximately $125 per linear foot.[xxiii] This is one-half of the total cost of the greater frontage length since it accounts for the distribution of the costs between two dwellings on opposite sides of the street.

The regulatory cost barrier for lot width requirements is equal to the *difference* between the jurisdiction-required lot width and the benchmark lot width*, multiplied by* the unit length cost for the roadway (which is dependent upon the required roadway paved width) and associated utilities. For example, if the required lot width exceeds the benchmark lot width by 20 feet, the regulatory cost barrier is estimated at $125/linear foot *multiplied by* 20 feet, which *equals* $2,500.

4.2.4 Road Width

If the planning jurisdiction required a minimum paved road width larger than benchmark widths of 23 to 24 feet listed in Tables 4.1 and 4.2, researchers estimated a regulatory cost barrier based on the additional land required and additional paving of the road.

The unit cost factor for bituminous asphalt paved road construction, based on estimates developed using construction cost data in *RS Means Site Work Construction Costs*, 2005,[xxiv] is projected to be $1.15 per square foot. The estimate of $2.30 per square foot was reduced by 50 percent to account for the costs per dwelling unit being split between two units on opposite sides of the street.

The regulatory cost barrier for road widths greater than the benchmark value, is estimated to be the *difference between* the jurisdiction-required and the benchmark value for street widths, in feet, *multiplied by* the jurisdiction-required minimum lot frontage in feet, *multiplied by* cost per square foot for roadway construction. For example, if the required road width is 5 feet greater than the benchmark width and if the required lot width is 60 feet, the cost for the additional 5 feet of road width is $1.15 *multiplied by* 5 feet, *multiplied by* 60 feet, which *equals* $345 per dwelling unit. Furthermore, researchers assumed that additional land costs of approximately the same unit costs as the paving would be incurred as well as additional costs for lengths of sewer laterals and water supply laterals.

4.2.5 Front Yard Setback Requirements

If the planning jurisdiction required a minimum dwelling setback distance from the edge of the street larger than the 13-foot "more dense" benchmark or 19-foot "less dense" benchmarks listed in Tables 4.1 and 4.2, the research team calculated a regulatory cost barrier due to the additional required infrastructure as compared with the benchmark setbacks.

Dwelling setback requirements from the paved edge of the street affect the cost of housing because they impact the distance between the house utility connections to the water and sewer laterals, and the right-of-way area utilized for the water supply and the sewer main pipes. In some cases, these water and sewer pipes may be beneath the roadway itself or it may be beneath the grassed boulevard strip between the edge of the sidewalk pavement and the edge of the roadway. The front setback distance will also affect the required driveway length and will thus affect driveway construction costs as well. Front, rear, and side setbacks greater than the benchmark values can also drive the total lot size requirement if the setbacks, when added to a proposed building footprint, comprise a total area which exceeds the minimum lot size specified in the zoning.

The cost factor per linear foot for the longer driveway will depend on the material of construction (asphalt or concrete) and on the width of the driveway. For this study, the team assumed a conservative width of eight feet, which is a required design width for a single-vehicle parking space. The estimated construction costs were taken as the average of the unit costs for concrete driveways and asphalt paved driveways. Adding the costs for installation of water supply lateral piping and sewer drain piping to the cost for driveway construction, the additional cost for each foot of front setback is approximately $60.

If the required setback between the building and the edge of the roadway exceeds the benchmark setbacks listed in Table 4.1 and 4.2, the regulatory cost barrier is the *difference* between the jurisdiction-required front setback and the benchmark front setback, *multiplied by* the combined unit length costs for longer driveways, sanitary sewer lateral, and water supply lateral installation.[xxv] If the required front setback is 10 feet greater than the benchmark front setback, then the cost barrier for this requirement is approximately $600 per dwelling unit.

4.2.6 Sidewalk Requirements

Due to a lack of consensus regarding the standards for sidewalks in denser MSAs, the research team did not attribute any cost barrier to sidewalk requirements in MSAs. The unit cost for concrete sidewalks, as indicated in Appendix B – Methods for Unit Infrastructure Costing, is $4.18 per square foot. The cost barrier for sidewalk requirements in non-MSAs was equal to

the unit cost factor for sidewalks, *multiplied by* the required width of the sidewalk (typically 4 feet), *multiplied by* the required lot width.

For a street frontage of 60 feet, the cost barrier for one sidewalk in a non-MSA area is 60 feet, *multiplied by* 4 feet, *multiplied by* $4.18 per square foot, which *equals* $1,003. This cost is then *divided by* two to obtain a per-dwelling unit cost of $501.50, which accounts for costs being spread over two dwellings on opposite sides of the street.

4.2.7 Open Space Requirements

If a planning jurisdiction required a minimum percentage of land reserved for open space larger than benchmarks indicated in Tables 4.1 and 4.2—11.5 percent of the total land in the subdivision in "less dense" communities or 12.9 percent in "more dense" communities—the research team calculated a regulatory cost barrier due to the additional land required with respect to the benchmark standards for open space.

In some cases the open spaces will be designated as active recreational areas and will be landscaped and possibly include additional plantings. If the rules of the subdivisions or zoning ordinances require that the open space be developed as "parkland," there will be additional costs not addressed in this study for footpaths or sidewalks, street lights, landscaping, park benches, and possibly other park amenities. The costs for any required landscaping or park-related amenities were not accounted for in this study because the need for these amenities of the required open space is generally not specified in either subdivision rules or zoning ordinances.

The unit cost for open space was taken to be the raw land cost presented in Table 4.3. The cost depends on whether or not the jurisdiction is in an MSA or non-MSA, and on the U.S. Census region in which the jurisdiction is located. In areas where non-buildable wetland or stormwater retention areas can satisfy the jurisdiction requirements for open space, the actual unit cost would likely be lower than the national average raw land costs in Table 4.3.

If the jurisdiction-required subdivision open space exceeds the benchmark open space listed in Tables 4.1 and 4.2, the regulatory cost barrier is the *difference* between the jurisdiction-required open space and the benchmark open space, *multiplied by* the cost per unit area for raw land. To convert the values to a per-dwelling-unit basis, the percentage difference between benchmark and the required open space is *multiplied by* the required minimum lot area. For example, if the required minimum lot area for an MSA jurisdiction is 6,000 square feet (based on national average MSA land costs), and the *difference* between the required open space and the benchmark open space is 5 percent, the regulatory cost barrier for this requirement is 6,000 square feet, *multiplied by* 0.05, *multiplied by* $2.22 per square foot, which *equals* $666.

5. Regulatory Cost Barriers

A key objective of this study was to develop a national estimate of the cost of excessive land and site development standards on SFD housing built in subdivisions. The study uses a four-step methodology for developing the national cost estimates: (1) collect regulatory standards from a sample of jurisdictions for selected variables; (2) establish benchmark values and unit costs for each variable; (3) produce a cost estimate for regulatory cost barriers based on the application of the benchmark values and costs to the regulatory standards from the sample jurisdictions; and (4) create a national estimate of the regulatory cost barriers.

The previous chapter presented the results of the survey of regulatory standards, the benchmarks used to estimate regulatory cost barriers, and the unit costs attributed to each variable. This chapter presents the results of applying the benchmarks to the regulatory standards for the sample jurisdictions and the resulting regulatory cost barriers. It presents two models for generalizing the regulatory cost barriers from the sample jurisdictions to the nation, and includes four cost estimates of regulatory cost barriers for the nation.

5.1 Cost Analysis of the Sample Jurisdictions

This section presents the methodology and results of the cost analysis for the sample jurisdictions. It includes a description of the methodology for the estimated cost of excessive regulation for the sample jurisdictions. It concludes with a sensitivity analysis of the costs of excessive regulation.

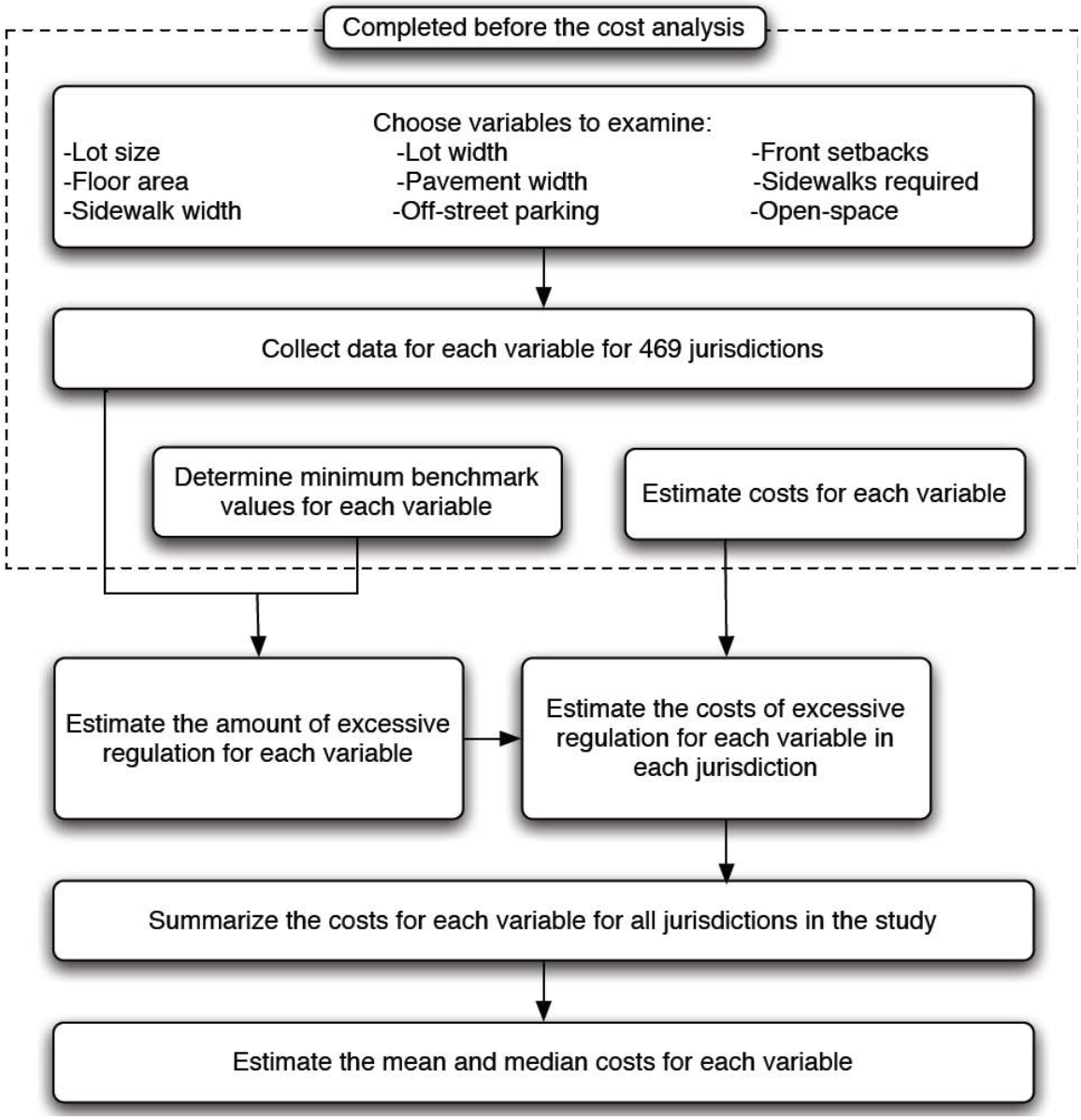
5.1.1 Methods

The first step in developing the national cost estimates was to produce an estimate of the regulatory cost barriers for the 469 sample jurisdictions. The estimate of the total regulatory cost barriers of the sample jurisdictions was built from estimates of the regulatory cost barriers for each of the nine variables. This sample estimate also allowed average per-dwelling costs to be calculated for the variables.

The data presented in Sections 3.0 Existing Regulations, and 4.0 Standards Benchmarks and Unit Costs provide the foundation for the national costs estimates: (1) a summary of the survey of regulatory standards; (2) a summary of the benchmark survey; and (3) the unit cost of exceeding the benchmark values for each of the variables.

Figure 5.1 shows the steps in developing the estimates of the regulatory cost barriers for the 469 sample jurisdictions. The process for estimating the regulatory cost barriers in the sample jurisdictions is summarized below Figure 5.1 and presented in detail in Appendix E – Cost Estimation Methods for Sample Jurisdictions and National Costs.

Figure 5.1: Process for Determining the Costs of Excessive Land Use Regulation for Jurisdictions in the Sample



Source: ECONorthwest, 2006

The process for estimating the regulatory cost barriers in the sample jurisdictions included the following steps:

1. *Select variables.* The first step was to select the land and site development variables to examine from subdivision and zoning ordinances.
2. *Review ordinances from sample jurisdictions.* The next step was ordinance review, which involved collecting regulatory standards for each of the variables from the zoning and subdivision ordinances from the sample jurisdictions.

3. *Establish benchmarks.* The benchmark survey established benchmark values for each variable.

4. *Develop unit cost assumptions.* The cost analysis required unit cost assumptions for each variable. For example, cost per square foot of land or per lineal foot of sewer line.

5. *Identify variance from benchmarks.* The benchmarks (from Step 3) were applied to the data collected for each variable in each jurisdiction (from Step 2) to determine the degree to which a category of land development standard exceeded the benchmark value for that category of standard.

6. *For each variable, estimate cost of regulations requiring a variance from the benchmarks.* The unit cost of each variable (from Step 4) was applied to the amounts of variance from the benchmark (from Step 5) to estimate the costs of the regulation that required the variance from the benchmark. These costs are all on a per-dwelling-unit basis.

7. *Aggregate costs to reflect total costs for sample.* The costs of regulations requiring a variance from the benchmark (from Step 6) were summed for all jurisdictions in the sample to produce a total regulatory cost barrier for the required variances from each of the benchmarks.

8. *Estimate mean and median costs of regulatory barriers for the sampled jurisdictions.* From the total regulatory cost barrier for each variable , summed over the sample of 469 jurisdictions (from Step 7), the mean and median regulatory cost barriers for each variable were determined. These means and medians apply to the subset of the total sample of jurisdictions in which there was a calculated non-zero regulatory cost barrier for that variable.

The following provides an example of how these steps were applied to regulatory requirements for one of the nine variables, minimum floor areas.

1. The project team included minimum floor area requirements as a variable in the study.

2. Ordinance review showed that 86 of the sample jurisdictions had minimum floor area requirements.

3. The benchmark survey established maximum values for floor area requirements of 981 square feet for jurisdictions within an MSA and 1,481 square feet for jurisdictions outside an MSA.

4. The project team established a unit cost factor of $75 per square foot for excessive floor area requirements.

5. The benchmark value (from Step 3) was *subtracted* from the floor area requirement in each jurisdiction (from Step 2), resulting in the variance between the required and the benchmark floor area requirement for each jurisdiction.

6. The variance in floor area requirements (from Step 5) was *multiplied by* $75 per square foot (from Step 4), resulting in the total regulatory barrier cost of floor area regulation for each jurisdiction.[xxvi]

7. The total regulatory cost barrier for floor area regulation for each jurisdiction was *summed*, producing an aggregate regulatory cost barrier of excessive floor area requirements for the sample jurisdictions. As indicated in Table 5.2, this value is $880,000.

8. The mean and median costs of excessive floor area regulation for the sample of jurisdictions were calculated, resulting in two estimates of the regulatory cost barrier of floor area regulation for one SFD dwelling unit. As indicated in Table 5.2, the mean was $26,581 and the median was $16,425.

5.1.2 Results

Table 5.1 shows a summary of the number of jurisdictions with requirements from each variable. Of the 469 jurisdictions in the study, 439 had regulatory standards for one or more of the variables listed in the table. The most common regulatory standards were for lot size, front setbacks, off-street parking, and lot width. The least common requirements were floor area and open space.

Table 5.1 also shows the number of jurisdictions that exceeded the benchmarks. Of the 439 jurisdictions with one or more regulatory standards, 425 jurisdictions had one or more regulatory standards that exceeded the benchmarks. Jurisdictions exceeded the benchmarks most frequently for off-street parking, front setbacks, lot width, and lot size. Jurisdictions exceeded the benchmarks least frequently for floor area, sidewalk requirements, open space, and sidewalk width requirements.

Table 5.1: Summary of Jurisdictions with Regulatory Standards and Jurisdictions Exceeding the Benchmarks by Variable

	Jurisdictions with regulatory standards		Jurisdictions that exceed benchmarks		
Variable	Number	Percent of total	Number	Percent of jurisdictions with regulatory standards	Percent of all jurisdictions
Lot size	419	89%	305	73%	65%
Lot width	342	73%	295	86%	63%
Front setbacks	413	88%	370	90%	79%
Floor area	86	18%	36	42%	8%
Pavement	192	41%	134	70%	29%
Sidewalk	241	51%	40	17%	9%
Sidewalk width	153	33%	60	39%	13%
Off-street parking	367	78%	15	4%	3%
Open space	99	21%	27	27%	6%
Total	**439**	**94%**	**425**	**97%**	**91%**

Source: Survey of Regulatory Standards, University of Oregon Community Planning Workshop, with calculations by ECONorthwest

Table 5.2 shows the costs of excessive regulation by variable for all jurisdictions.

The total regulatory cost barriers for the jurisdictions in the sample was about $5.6 million and the average cost per dwelling unit was more than $13,000.

The variables with the largest share of total costs were lot size, floor area, and lot width. The variables with the smallest share of the costs were sidewalk width, off-street parking, and open space requirements.

The detailed analysis of the results for each land development variable is provided in Appendix F – Excel Workbook for Regulatory Cost Barrier Calculations. Lot size, lot width, and floor area accounted for the largest percentage of total costs for a variety of reasons, described below.

- Lot size regulations accounted for the largest percentage of cost (65 percent). Land that is permitted for residential development is costly and is the major component of the costs of excessive lot size requirements.

- Sixty-five percent of jurisdictions in the sample exceeded the lot size benchmark. On average, jurisdictions with excessive lot size requirements exceeded the benchmarks by 6,573 square feet. The frequency and magnitude of lot size requirements greater than the benchmarks, combined with the cost of land resulted in the regulatory cost barrier for lot

size accounting for the majority of total costs of the regulatory cost barriers for all the land and site development variables considered in this study.

- Excessive lot width requirements account for a moderate share of costs (9%) because 63 percent of jurisdictions with lot width regulations exceeded the benchmarks. The costs associated with lot widths included land, sanitary sewer main, water main, street paving, curb and gutter, sidewalk construction, landscaping, and storm sewer.

- Floor area had a disproportionately large impact on total regulatory barrier costs in proportion to the number of jurisdictions with excessive floor area requirements. Only 8 percent of jurisdictions had excessive floor area requirements, but the regulatory cost barriers for floor area for those jurisdictions accounted for 17 percent of the total regulatory cost barriers for all land development variables for all the jurisdictions in the study. This resulted from the relatively high cost per square foot of required floor area and the fact that the mean differential between required floor area and benchmark floor areas was 354 square feet (or more than $26,000 per dwelling unit).

Table 5.2 shows that the mean cost per dwelling unit for regulatory cost barriers associated with all the land development variables was $13,142 and the median cost was $4,950. Floor area had the largest mean and median cost per dwelling unit, followed by lot size. Sidewalk width and street pavement width had the smallest mean and median cost per dwelling unit.

Table 5.2: Regulatory Cost Barriers for All Jurisdictions and Costs Per Dwelling Unit Variable

	Costs for all jurisdictions		Costs of excessive regulation per dwelling unit			
Variable	Total	Percent of total	Mean	Median	Minimum	Maximum
Lot size	$ 3,648,726	65%	$ 11,963	$ 5,596	$ 216	$ 405,099
Lot width	$ 526,529	9%	$ 1,785	$ 1,120	$ 36	$ 16,142
Front setbacks	$ 231,952	4%	$ 627	$ 570	$ 52	$ 4,195
Floor area	$ 956,925	17%	$ 26,581	$ 16,425	$ 1,425	$ 113,925
Pavement	$ 64,993	1%	$ 485	$ 354	$ 12	$ 2,134
Sidewalk	$ 63,001	1%	$ 1,575	$ 1,672	$ 468	$ 3,344
Sidewalk width	$ 14,631	0%	$ 244	$ 211	$ 0	$ 1,782
Off-street parking	$ 22,183	0%	$ 1,479	$ 1,079	$ 270	$ 2,159
Open space	$ 56,620	1%	$ 2,097	$ 616	$ 7	$ 24,846
Total	**$ 5,585,560**	**100%**	**$ 13,142**	**$ 4,950**	**$ 2**	**$ 407,429**

Source: Survey of Regulatory Standards, University of Oregon Community Planning Workshop, with calculations by ECONorthwest

5.1.3 Sensitivity Analysis

The benchmark values were determined by a survey of land-use experts, as described in Chapter 4. The purpose of the survey was to establish a consensus on reasonable minimum

regulatory requirements for each variable. The benchmark standards are the average value for each surveyed standard from all survey respondents.

Recognizing that reasonable people might have different conclusions with respect to where the benchmarks should be set, the research team performed sensitivity testing on the benchmarks to determine how changes would impact the cost estimates. The team used the minimum and maximum benchmark values for each variable as input values for the sensitivity testing.

Table 5.3 shows the results of sensitivity testing on the total and mean costs for the sample jurisdictions. The estimate of the cost of excessive regulation for the study sample using the mean values for the benchmarks was $5.6 million for all jurisdictions in the sample. The mean estimate of cost of excessive regulation per dwelling unit was $13,142. The total cost for the sample jurisdictions using the smallest benchmark values was $10.7 million and the mean cost per dwelling was $24,475 (smaller benchmark values resulted in more jurisdictions exceeding the benchmarks). When the research team used the largest benchmarks (which decrease the amount of excessive regulation), the total cost for all jurisdictions in the sample was $2.6 million and the mean cost per dwelling unit was $10,013.

The data in Table 5.2 show that the variables with the greatest share of the costs were lot size and floor area. When using the smallest and largest benchmark values these variables continue to make-up the majority of costs of excessive regulation.

Using the mean value benchmarks, lot size accounted for 65 percent of the total costs and floor area accounted for 17 percent of total costs. The total cost of excessive regulation of lot size was $3.6 million and floor area cost about $957,000.

- With the smallest benchmarks, lot size accounted for just over 50 percent of the total regulatory cost barrier. The total cost of excessive regulation of lot size was about $5.5 million.

- With the smallest benchmarks, floor area accounted for one-third of the total costs of excessive regulation because using the smallest floor area benchmark resulted in considerably larger variances between the required floor areas and the benchmark floor areas. This change in benchmark values resulted in a much larger total regulatory cost barrier for floor size which was estimated at $3.4 million for all sampled jurisdictions.

- With the largest benchmarks, lot size accounted for about 82 percent of total regulatory cost barriers. The total regulatory cost barrier was about $2.1 million. The maximum lot size benchmark value was much larger than the mean lot size benchmark, resulting in a smaller number of jurisdictions exceeding benchmarks. However, the aggregate regulatory cost barrier for lot size for all jurisdictions did not show a proportional decrease to the decrease in the numbers of jurisdictions which exceeded benchmarks. This resulted in a

larger average regulatory cost barrier for lot size using the largest benchmarks ($21,279 for largest benchmarks versus $11,963 for the mean benchmarks).

- With the largest benchmark, floor area accounted for 4 percent of the total costs of excessive regulation because the maximum floor area benchmark was much bigger than the mean floor area benchmark. This change in benchmark values resulted in smaller regulatory cost barriers for floor area requirements, decreasing the percentage of total costs accounted for by floor area regulation. The total regulatory cost barrier using the largest benchmarks was only $101,250. Only 7 out of the 86 jurisdictions with standards for floor area had regulatory cost barriers using the largest floor area benchmarks.

Table 5.3: Results of Sensitivity Testing on Total and Mean Regulatory Cost Barriers in the Sample Jurisdictions

	Study benchmark assumptions			Smallest benchmark values			Largest benchmark values		
	Total Costs	% of total costs	Mean Costs	Total Costs	% of total costs	Mean Costs	Total Costs	% of total costs	Mean Costs
Lot size	$ 3,648,726	65%	$ 11,963	$ 5,492,460	51%	$ 13,697	$ 2,106,601	82%	$ 21,279
Lot width	$ 526,529	9%	$ 1,785	$ 899,847	8%	$ 2,719	$ 142,864	6%	$ 1,742
Front setbacks	$ 231,952	4%	$ 627	$ 537,979	5%	$ 1,306	$ 43,814	2%	$ 996
Floor area	$ 956,925	17%	$ 26,581	$ 3,438,000	32%	$ 43,519	$ 101,250	4%	$ 14,464
Pavement	$ 64,993	1%	$ 485	$ 59,082	1%	$ 372	$ 54,154	2%	$ 685
Sidewalk	$ 63,001	1%	$ 1,575	$ 63,001	1%	$ 1,575	$ 63,001	2%	$ 1,575
Sidewalk width	$ 14,631	0%	$ 244	$ 14,631	0%	$ 244	$ 14,631	1%	$ 244
Off-street parking	$ 22,183	0%	$ 1,479	$ 22,183	0%	$ 1,479	$ 22,183	1%	$ 1,479
Open space	$ 56,620	1%	$ 2,097	$ 192,970	2%	$ 2,053	$ 24,812	1%	$ 6,203
Total	**$ 5,585,560**	**100%**	**$ 13,142**	**$ 10,720,154**	**100%**	**$ 24,475**	**$ 2,573,310**	**100%**	**$ 10,013**

Source: Survey of Regulatory Standards, University of Oregon Community Planning Workshop, with calculations by ECONorthwest

5.2 National Estimates of the Regulatory Cost Barriers for Housing in Subdivisions

This section presents the methodology and results of the national cost estimate. It includes a brief description of two ways to model the national costs of excessive regulation. The section presents the cost of excessive regulation for the nation and sensitivity testing of the national cost of excessive regulation.

5.2.1 Methods

A key objective of this study was to develop a national estimate of the cost of excessive regulation on housing developed in subdivisions. The methodology used (a national sample of jurisdictions with the authority to adopt regulations) was intended to result in sample data that could be inferred to the national level. To accomplish this, the research team developed and

tested several models to weight the sample data to represent the regulatory cost barriers for land development requirements for the entire United States.

The models for estimating the national regulatory cost barriers build from the results of the cost analysis, and use the mean estimates of regulatory cost barriers per dwelling unit for the sample jurisdictions. Because the sample data resulted in cost estimates on a per-dwelling-unit basis, the team weighted the regulatory cost barriers from the sample to the national level by using the U.S. Census Bureau's Census of Construction estimates of single-family building permits issued for the nation in 2004.[xxvii]

The research team developed two models of the national regulatory cost barriers—an aggregated model and a disaggregated model. The models use different assumptions about the geographic distribution of regulatory standards for the land development variables listed in Table 5.3.

The aggregated model assumed that the geographic distribution of regulatory standards for the land development variables would not vary based on Census region or MSA status within the nation. The aggregated model is based on the assumption that development of new SFD housing in each of the four U.S. Census regions and whether or not the development is located within an MSA would average about the same regulatory cost barriers for each land development variable as the 469 sample jurisdictions. In other words, the regulatory cost barriers would be about the same for all parts of the nation.

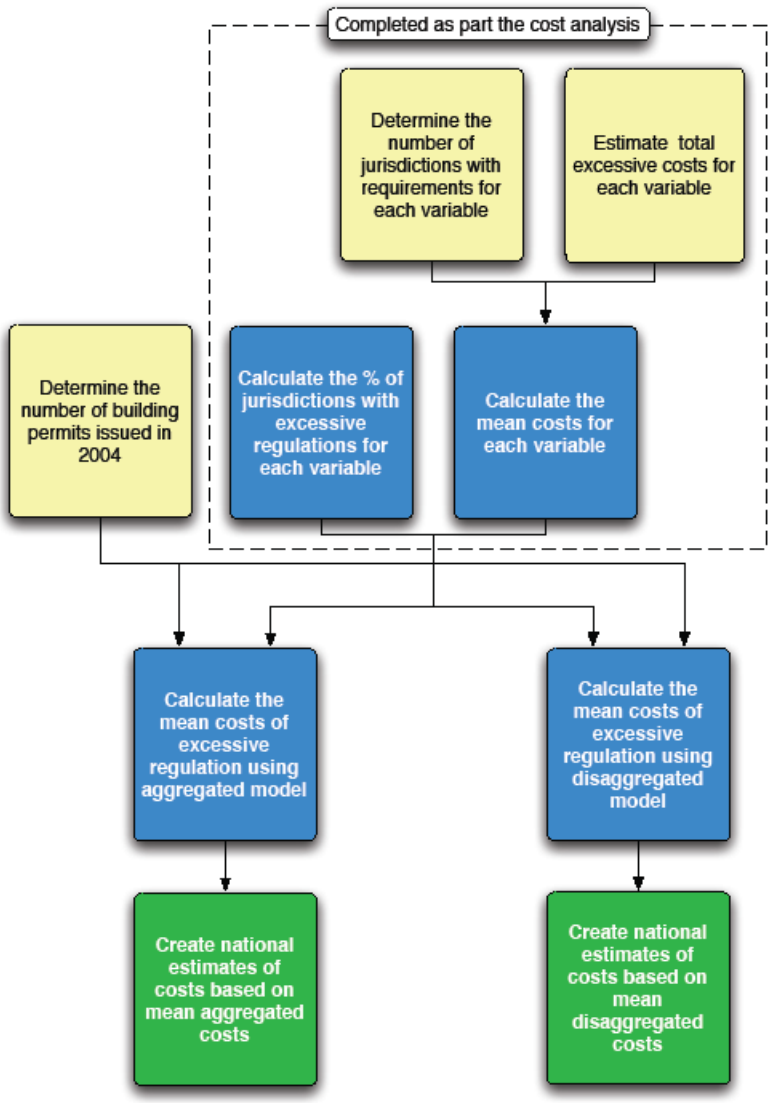
The advantage of the aggregated model is that the size of the study sample is big enough that we are relatively certain that the average regulatory cost barrier that we found for each variable in the study is close to the true average of the regulatory cost barriers for that variable, on a national basis.

The disadvantage of the aggregated model is that it doesn't allow for separate consideration of regional variations in the distributions of standards, which results in higher estimates of national aggregate regulatory cost barrier as compared with the national disaggregated estimate of the regulatory cost barrier.

The disaggregated model assumed that the regulatory cost barriers would vary across regions and urban and rural areas within the nation. The disaggregated model is based on the assumption that the regulatory cost barriers vary between different regions in the nation and between urban and rural areas. The disaggregated model applies different regulatory cost barriers to new SFD development based on location (one of the four Census regions) and density of development (whether the development takes place in an MSA or not).

The research team developed two models of the national regulatory cost barriers —an aggregated model and a disaggregated model. Figure 5-2 shows the steps in developing the national estimate of the cost of excessive regulation on housing in subdivisions. Below is a summary of the process used in each model. A detailed description of the methodologies for the models is presented in Appendix E – Cost Estimation Methods for Sample Jurisdictions and National Costs.

Figure 5.2: Process for Modeling the Nationwide Regulatory Cost Barriers



Source: ECONorthwest, 2006

The process for estimating the regulatory cost barriers at the national level included the following steps:

1. *Develop sample cost estimates.* The cost analysis provided the following information: the number of jurisdictions in the sample with requirements for each variable; estimates of total regulatory cost barriers for each variable;[xxviii] the mean cost of each variable for the sample jurisdictions; and the percent of jurisdictions in the sample with regulatory cost barriers for each variable.

2. *Collect building permit data.* The next step was to gather the number of building permits issued in 2004 for the nation and the four Census regions. Table 5.4 presents this information.

3. *Apply building permit data to sample cost estimates.* The information from the cost analysis (Step 1) was combined with the number of building permits issued in 2004 (Step 2) to produce two estimates of the national regulatory cost barriers for each variable. These estimates were based on the following models:

    - The aggregated model used the cost estimates for the sample jurisdictions from Tables 5.1 and 5.2 and the number of building permits issued nationwide in 2004 (Table 5.4).
    - The disaggregated model used cost estimates for the sample jurisdictions where the jurisdictions were grouped by the Census regions and whether they belonged to an MSA. These cost estimates are presented in Appendix E – Cost Estimation Methods for Sample Jurisdictions and National Costs in Tables E.3 through E.9. The disaggregated model used the number of building permits issued for each Census region and MSA status in 2004 (Table 5.4).

4. *Weight costs to national level.* The final step was to sum the estimates of the regulatory cost barriers for each variable to produce two estimates of the national costs of excessive regulation, one estimate for the aggregated model and another estimate for the disaggregated model.

Table 5.4 shows the number of building permits issued for SFD dwellings in 2004. The aggregated model used the estimate of approximately 1.6 million building permits issued for SFD dwellings in the United States. The disaggregated model used the estimates of the number of building permits issued for SFD dwellings in each of the Census regions and MSA status.

Table 5.4: Number of Building Permits Issued for Single-Family Detached Dwellings in the United States and Each Census Region and MSA Status, 2004

Region and MSA status	2004 Building permits
U.S.	1,613,445
Northeast MSA	102,571
Northeast non-MSA	29,187
Midwest MSA	240,241
Midwest non-MSA	55,281
South MSA	665,526
South non-MSA	90,613
West MSA	384,627
West non-MSA	45,399

Source: U.S. Census of Construction, 2006

The following example shows how these steps were applied to determine national costs of regulatory cost barriers for lot size using the aggregated model.

1. The cost analysis provided the following information about lot sizes from the sample jurisdictions—65 percent of jurisdictions had regulatory barriers for lot size (Table 5.1), and the mean regulatory cost barrier for lot size regulation was $11,963 per dwelling unit (Table 5.2)

2. Table 3.4 shows that approximately 1.6 million building permits were issued for SFD dwelling units in the United States in 2004.

3. The regulatory cost barrier for lot size was calculated in the following way—the percent of jurisdictions with excessive lot size regulation (65%) was *multiplied by* the number of building permits issued for the nation in 2004 (1,613,445 dwelling units). The result (1,048,739 dwelling units with regulatory cost barriers for lot size) was *multiplied by* the mean regulatory cost barrier for lot size regulation from the sample ($11,963 per dwelling unit). The result was that the regulatory cost barrier for regulation of lot sizes was approximately $12.5 billion nationwide in 2004.

4. This process was repeated for the other eight variables to produce national estimates of the regulatory cost barrier for each variable. These costs were *added* to produce a national estimate of the regulatory cost barriers of the land use standards considered in this study of approximately $19.2 billion.

The process for estimating the costs of excessive regulation for the disaggregated model was very similar to the process presented above. The difference is that the disaggregated model used the information presented in Tables E-3 through E-9 in Appendix E to create cost estimates for each Census region and MSA status.

5.2.2 Results

Table 5.5 shows the results of the aggregated model of the regulatory cost barriers for the nation. The national estimate of regulatory cost barriers for land and site development regulations was $19.2 billion for 2004.

The variables with the largest proportion of excessive costs were lot size, floor area, and lot width. The average regulatory cost barriers for one dwelling unit was $11,910. This is equal to the mean cost per dwelling unit for regulatory cost barriers ($13,142), *multiplied by* the percent of jurisdictions in the sample that exceeded any benchmark standards (91%). In comparison with the average cost for a new single-family dwelling in the United States in 2004, which was $244,000, the average per-unit regulatory cost barrier is approximately 5 percent of that average selling price.

Table 5.5: Aggregated Model Estimates of the Regulatory Cost Barriers for All Building Permits Issued for Detached Single-Family Dwelling Units in the Nation, 2004

Aggregated model	Cost estimates	
National cost of excessive regulation	**$**	**19,215,338,860**
Lot size	$	12,552,280,392
Lot width	$	1,811,355,507
Front setbacks	$	797,956,481
Floor area	$	3,291,995,430
Pavement	$	223,586,056
Sidewalk	$	216,734,720
Sidewalk width	$	50,334,294
Off-street parking	$	76,312,500
Open space	$	194,783,479
Per single family dwelling unit	$	11,910

Source: ECONorthwest, 2006

Table 5.6 shows the estimate of regulatory cost barriers for the disaggregated model. The total cost of regulatory cost barriers for the nation according to the disaggregated estimate was about $14.6 billion for 2004.

In this model, the variables with the largest proportion of excessive costs were lot size, lot width, and front setbacks. The average regulatory cost barriers for one dwelling unit was $9,051.

Table 5.6: Disaggregated Model Estimates of Regulatory Cost Barriers for All Building Permits Issued for Single-Family Dwelling Units in the Nation, 2004

Disaggregated model	Cost estimates
National cost of excessive regulation	**$ 14,603,018,827**
Lot size	$ 11,137,670,615
Lot width	$ 1,551,371,592
Front setbacks	$ 743,335,966
Floor area	$ 872,800,196
Pavement	$ 96,777,852
Sidewalk	$ 36,107,707
Sidewalk width	$ 21,564,900
Off-street parking	$ 73,915,367
Open space	$ 69,474,632
Per single family dwelling unit	$ 9,051

Source: ECONorthwest, 2006

The cost estimates for the aggregated model are higher than for the disaggregated model because the aggregated model costs did not take into account variations in the regulatory cost barriers among the regions and MSA status. The aggregated model used the same mean cost estimate for each variable for all Census regions and for both MSAs and non-MSAs. The disaggregated model took these variations into account, which resulted in lower estimates of the cost of excessive regulation.

Table 5.2 shows the mean costs of excessive regulation per dwelling unit for each variable, which were used in the aggregated model. The cost estimates used in the disaggregated model are shown in Appendix E Table E-8 and are separated by region and MSA status. The mean and median regulatory cost barriers for each variable differed between the aggregated and disaggregated models. Some instances of these variations are illustrated below.

- Differences in assumptions about excessive floor area requirements accounted for more than half of the difference in total costs between the aggregated and disaggregated models. The aggregated model estimated that the mean regulatory cost barrier for regulation of floor area was $26,581 and that 8 percent of jurisdictions exceeded the benchmark for floor area requirements (Tables 6.1 and 6.2). In Appendix E, Table E-11 shows that these assumptions resulted in a total regulatory cost barrier for floor area regulation of about $3.3 billion for the nation in 2004. In contrast, in the disaggregated model nearly all the jurisdictions with excessive floor area requirements were located within an MSA. The frequency of excessive floor area requirements within an MSA ranged between a high of 16 percent of jurisdictions in the South, to a low of 6 percent of jurisdictions in the West (Appendix E, Table E-6). The disaggregated model used mean regulatory cost barriers for floor area requirements of between $35,175 per dwelling unit in the Northeast to $16,425 per dwelling unit in the Midwest (Appendix E, Table E-8). Table E-13 shows that the total regulatory cost barrier for floor area from these assumptions was about $872 million for the nation in 2004.

- Differences in lot size assumptions accounted for nearly one-third of the cost differences between the aggregated and disaggregated models. Table 5.2 shows that the mean regulatory cost barrier for lot size requirements for all jurisdictions in the sample was $11,963. Table E-8 in Appendix E shows that the mean cost of excessive regulation of lot size varied across regions and whether the jurisdiction belonged to an MSA. For instance, jurisdictions in the sample located outside an MSA in the South had a mean regulatory cost barrier for lot size of $4,488 per dwelling unit. Jurisdictions located in the Midwest within an MSA had mean regulatory cost barrier for lot size of $16,425. These differences were caused by differences in the cost of land between the regions and differences in the degree of variance from the benchmarks between regions. The aggregated model does not allow for these types of variations in costs and requirements, resulting in greater estimates of the regulatory cost barriers for lot size requirements. The regulatory barrier estimate for lot size requirements for the disaggregated model was $11.1 billion as compared with $12.5 billion for the aggregated model.

5.2.3 Sensitivity Analysis

The research team performed the same sensitivity analysis on the national models of the regulatory cost barriers as it performed on the cost analysis for the sample jurisdictions. The team used the smallest and largest benchmark values to get an idea of what the range of national regulatory cost barriers might be.

Table 5.7 shows the results of the sensitivity analysis. For the aggregate model, the total national regulatory cost barrier using the study benchmark values was $19.2 billion for 2004. With the smallest benchmarks, this rose to $36.9 billion in 2004. Using the largest benchmark values, it dropped to $8 billion for 2004.

For the disaggregated model, the total national regulatory cost barrier using the study benchmark values was $14.6 billion for 2004. With the smallest benchmarks, it rose to $24.6 billion in 2004. Using the largest benchmarks, the total national regulatory cost barrier estimate dropped to $6.6 billion for 2004.

Table 5.7: Results of Sensitivity Tests of the Aggregated and Disaggregated Models of the National Regulatory Cost Barrier Estimates, 2004

	Study benchmarks	Smallest benchmarks	Largest benchmarks
Aggregated model	$ 19,215,338,860	$ 36,879,271,157	$ 8,852,653,304
Disaggregated model	$ 14,603,018,827	$ 24,665,695,261	$ 6,622,266,833

5.3 Key Findings and Conclusions

- **The average cost of excessive regulation for one dwelling unit was about 5 percent of the average cost of a new home.** For the land development standards studied by the research team, the average regulatory cost barrier for one dwelling unit was $11,910. This is equal to the mean cost per dwelling unit for excess regulatory costs ($13,142), *multiplied by* the percent of jurisdictions in the sample that exceeded any benchmark standards (91%). In comparison with the average cost for a new single-family dwelling in the United States in 2004 ($244,000), the average per-unit regulatory cost barrier is 4.8 percent of that average selling price.

- **The regulatory cost barriers varied.** The regulatory cost barriers varied considerably in the sample jurisdictions, as well as across regions and MSA status. Assuming that the sample is representative of all jurisdictions in the nation, the national regulatory cost barriers should vary by region and whether the jurisdiction is part of an MSA.

  It is probable that the regulatory cost barriers also vary substantially within the U.S. Census regions. For instance, the cost of land often varies within a single metropolitan area, which would produce variation in the cost of excessive regulation within the metropolitan area. The actual regulatory cost barrier for any given jurisdiction depends on local regulations and costs of development.

- **The estimates of the regulatory cost barriers varied with changes in the benchmarks but they remained within an order of magnitude of the estimates.** The sensitivity analysis showed that the costs for the sample jurisdiction and national models of the regulatory cost barriers varied substantially depending on the benchmark values. However, the changes in either direction were neither twice nor one-half of the cost estimates. In other words, the actual regulatory cost barriers may be somewhat more or less than the estimates but the actual costs are relatively close to the estimates.

- **The disaggregated model provided the best national estimate of the regulatory cost barriers.** The disaggregated model accounted for variations in regulatory standards and costs among the Census regions and MSA status better than the aggregated model. The total mean regulatory cost barriers for land and site development standards in the disaggregated model was about $14.6 billion for the nation in 2004.

- **The $14.6 billion estimate of the national regulatory cost barriers is a conservative estimate.** Given the results of the study, the research team believes this estimate is conservative for several reasons. In the survey of regulatory standards, where there were multiple zoning districts in a jurisdiction, the team examined the residential zoning district that allowed the densest development. Where multiple zoning districts were present in a jurisdiction, the team collected data for the "border" zoning districts which were the densest zoned districts that allowed detached single-family dwellings. These border zones are generally located between high-density (apartments, townhouses) and medium-density single-family detached residential development. If the researchers had examined all zoning districts for every jurisdiction in the sample (which was impractical), greater levels of regulatory cost barriers may have been found. In the medium-density residential zoned districts adjacent to the border zones, required minimum lot areas are generally larger than in the border zones; hence the regulatory cost barriers due to required lot sizes greater than the benchmark lot areas would have been larger if these medium-density residential zoned districts had been included in the regulatory cost barrier analysis.

  The estimates of costs associated with the variables were relatively conservative. The cost assumption for floor area was $75 per square foot. This is highly dependent on the quality of the construction and the architectural and interior design features of the house. This cost was an average estimate for "economy" and "average" grade of construction for homes built with slab-on-grade foundations. If a jurisdiction requires expensive architectural details within its building code standards, the additional unit cost of floor area construction could result in considerably higher costs for excessive regulation of floor area. Of single-family detached homes sold nationwide in 2005, 31 percent had costs (exclusive of the lot cost) of less than $70 per square foot; 14 percent had costs in the range $70 to $80 per square foot; and 56 percent had costs of greater than $80 per square foot.[xxix]

  In reality, land costs may vary substantially on a neighborhood-to-neighborhood level in some areas. Compared with the "average" communities within a U.S. Census region, the communities within that Census region that have higher than average land costs may also be experiencing higher than average rates of new construction starts. In this case, regulatory cost barriers based on average land costs and total housing construction starts for the Census region may underestimate the actual regulatory cost barriers due to lot size requirements within that region.

6. Conclusions

Residential land developers and home builders recognize that excessive requirements for lot size and lot width add significantly to the cost of the finished dwelling.[xxx] [xxxi]

The costs to the developer, to the builder, and ultimately to the homebuyer, for lots and dwellings using smaller lot widths and smaller lot areas will be significantly lower than for dwellings developed on larger lots.

When a land planning jurisdiction has adopted land and site development standards which are larger than the set of minimum benchmark land development standards intended for protection of safety and public health, a significant regulatory cost barrier may be imposed on new residential single-family detached dwellings. There are added costs for the land development standards greater than the benchmark standards and there may also be benefits associated with those higher standards. The question of whether the added benefits are commensurate with the added costs is dependent upon many considerations. The evaluation of whether some of the benefits may be commensurate with the costs is an area that merits considerable investigation but is outside the scope of the present study.

For those jurisdictions with one or more regulatory cost barriers for land development standards, the mean per-housing-unit regulatory cost barrier is approx $12,000. Of all the planning jurisdictions in the nation, approximately 91 percent have one or more regulatory cost barriers for land development standards. The mean regulatory cost barrier for jurisdictions with a barrier, *multiplied by* the percentage of all jurisdictions that have one or more barriers, *equals* the average regulatory cost barrier for all planning jurisdictions. On a national average basis, the estimate for this regulatory cost barrier for the 1.6 million new SFD housing units constructed in the United States in 2004 is approximately $11,000.

The research team's estimate of the regulatory cost barrier due to land and site development standards imposed by planning jurisdictions is based on the "disaggregated" national regulatory cost barrier model, which accounts for differences between U.S. Census regions and between MSAs and non-MSAs. To the extent that the increased cost of new dwellings also raises the costs for existing dwellings or for existing vacant buildable lots,[xxxii] there are additional cost barriers, not quantified in this study, due to the influence of new housing prices on existing lot prices in the same general area.

In order for HUD's policies to have greatest impact on the reduction of regulatory cost barriers associated with land and site development standards, effort should focus on the most significant land and site development standards listed below in order of cost on a national basis:

- Lot size
- Interior square foot floor area
- Lot width

The other site and land development standards evaluated in the study had relatively small cost barriers in comparison with these three.

Local advocates for reduction in regulatory cost barriers may wish to use the regulatory barrier costing tool described in section 4.2.1.1 and presented in Appendix G to determine the regulatory cost barriers that apply in specific locations. This calculation would be based on local land costs and on the land development standards adopted by the local land planning jurisdiction or jurisdictions.

Based on the research team's focus group evaluation of procedural barriers to the land subdivision process, presented as Appendices 3 and 4, the three main procedural barriers resulting in increased costs to residential land developers which are passed on to builders and ultimately to homebuyers are:

- Local anti-growth political climate
- Inefficiency in the application process by large numbers of government review agencies
- Critical infrastructure deficiency in rural areas

Recently, the U.S. Department of Housing and Urban Development awarded 14 communities with the Robert L Woodson, Jr. Award for reducing burdensome regulations that unnecessarily inflate the cost of homes (NAHB, 2006, d). Specific noted reasons for the award that are consistent with the results of this study generally fall into the following categories:

- Reduction in land cost to the developer
- Reduction in the site and land development standards, leading to lower infrastructure costs for development of lots and for the construction of dwellings
- Reduction in time and costs to the developer for obtaining the required permits from a range of municipal land development authorities

The actions by these communities should be considered in other communities seeking to reduce regulatory cost barriers within the subdivision rules and zoning ordinances.

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[ii] Myths and Facts About Affordable and High Density Housing, California Planning Roundtable, downloaded from http://www.abag.ca.gov/services/finance/fan/housingmyths2.htm

[iii] Ibid

[iv] U.S. Department of Housing and Urban Development NOTICE PDR-2006-01

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[v] "It's a relatively simple formula -- developer builders are 'for profit' entities and each dollar added to construction goes right back into the cost of the home. The ability to manage/reduce construction costs by increasing efficiency will result in lower home pricing. Reducing processing times ultimately reduces the carrying costs associated with projects. Locally, processing times for some municipalities have almost doubled in the past five years. Quick math would indicate that a year longer in processing theoretically adds ~$2,250 per home in carrying costs (purchase 40 acres @ $150k = $6m; at 6 percent assume $360,000 in annual interest charges incurred; assuming 4 units per acre yields 160 homes; $360,000 interest/160 homes = $2,250)." Personal Communication, Mike Brilz, VP of Planning and Development, Pulte Homes, West Valley Division, Scottsdale AZ, March 14 2006

[vi] US Department of Housing and Urban Development *Proposed Model land Development Standards and Accompanying Model State Enabling Legislation,* 1993 edition, p. 1.

[vii] Freilich and Schultz (1995), *Model Subdivision Regulations: Planning and Law; Knoxville-Knox County Minimum Subdivision Regulations* (2004); *Proposed Model Land Development Standards and Accompanying Model State Enabling Legislation* (1993), written by the NAHB Research Center for the U.S. Department of Housing and Urban Development;; *Smart Neighborhoods: Managing Maryland's Growth* (2001), and Oregon's model code, *Model Development Code and User's Guide for Small Cities* (1999); American Planning Association's (APA) *Principles of Smart Development* (1998); APA's *Codifying New Urbanism* (2004); Nelson et al (2002), *The Link Between Growth Management and Housing Affordability: The Academic Evidence;;*

[viii] The U.S. Census groups states by region in two ways. One grouping method is by four regions, which include: the Northeast, Midwest, South, and West. The other grouping method divides the four regions into nine divisions, which include: New England, Middle Atlantic, South Atlantic, East South Atlantic, West South Central, East North Central, West North Central, Mountain, and Pacific. This study uses the four regions to group states.

[ix] The research team created four quartiles for population of jurisdictions within the sample. Each quartile is comprised of 25 percent of the jurisdictions in the sample

[x] The U.S. Census of Construction for 2004 lists the median lot size in the West census sub region as 7000 sq feet.

[xi] The U.S. census of Construction for 2004 lists the median lot size in the New England sub region as 22,000 sq. feet.

[xii] U.S. Census of Construction for 2005. Downloaded from http://www.census.gov/const/C25Ann/lotsizesolddetpr.pdf

[xiii] HUD's Affordable Housing Design Advisor Web site http://www.designadvisor.org/

[xiv] Design Centre for Sustainability at UBC downloaded from http://www.sgog.bc.ca/uplo/Sq1Housing.pdf

[xv] Ibid

[xvi] U.S. Census of Construction Survey for 2005, Median and Average Square Feet of Floor Area in New One-Family Houses Completed by Location: Built For Sale. Downloaded from http://www.census.gov/const/C25Ann/sfforsalemedavgsqft.pdf

[xvii] U.S. Census of Construction Survey for 2005: Interior floor areas. Downloaded from http://www.census.gov/const/C25Ann/soldsqftdetach.pdf

[xviii] The details on the land cost estimation is given in the Appendix B. The details on the assumptions used with the RS Means costing approach is given in Appendix B. The details on the unit costs for infrastructure elements are given in the Appendix B and in Excel spreadsheet "Current cost analysis." Appendix F. Summaries for all land and site development standards are given in the "cost" tab. Details for each land or site development standard given in the worksheet labeled as that standard.

[xix] Discussions with potential local user groups such as Home Builder Associations are needed to verify that there is interest in using the tool to obtain estimates of regulatory cost barriers for a relatively well defined geographic area.

The research team is evaluating possible funding mechanisms for the verification and deployment of this tool. Possible steps that would need to be taken for verification include:

a) one or more local user groups supplies the local land cost information and possibly local infrastructure cost factors; b) the tool computes the regulatory cost barriers associated with

land and infrastructure and provides the results in a simple report format; c) the local user evaluates the utility of the report format and provides feedback for modification if necessary

[xx] 1 story economy grade - 1200 square foot structure $70.25; 1800 square foot structure $61.50; 2 story average quality grade 1800 square foot structure $85.03; 2,000 square foot average grade structure $81.63 from 2005 RS Means Residential Construction costs. see Appendix B Unit Cost Estimates

[xxi] U.S. Census of Construction data for price of housing per square foot. Downloaded from http://www.census.gov/const/C25Ann/soldpricesqftdetach.pdf

[xxii] U.S. Census of Construction data for median cost of construction per square foot. Downloaded from http://www.census.gov/const/C25Ann/soldmedavgppsfdetach.pdf

[xxiii] See Appendix B; detailed formula given in "Lot Width" worksheet in Subdivision Requirements as a Regulatory Barrier to Affordable Housing ; Cost Analysis Workbook, Appendix F

[xxiv] See Appendix 3.3; detailed formula given in "Pavement Width" worksheet in Subdivision Requirements as a Regulatory Barrier to Affordable Housing current cost analysis 0329.xls ;

[xxv] See Appendix 3.3; detailed formula given in "Front Setback" worksheet in Subdivision Requirements as a Regulatory Barrier to Affordable Housing current cost analysis 0329.xls;

[xxvi] If the benchmark was larger than a jurisdiction's minimum requirement for a variable, the result of Step 6 would be a negative cost. In other words, the jurisdiction's requirements allowed for less expensive development than the benchmark. We excluded negative costs from our calculations because the focus on the study was the costs of excessive regulation.

[xxvii] This figure includes all permits issued for single-family dwellings in 2004. This includes dwellings on lots in subdivisions and other dwellings. The Census Bureau's Current Construction Reports, the data source used for building permits, does not distinguish between single-family permits issued in subdivisions and other permits.

[xxviii] The cost analysis included calculation of the mean and median cost of regulatory cost barriers for each variable. In creating the national estimate of the cost of excessive regulation, we used the mean cost estimates. The mean cost estimates provide a better estimate of regulatory cost barriers because mean cost estimates use the average costs, rather than the mid-point costs. In other words, the mean cost estimates reflect the total aggregate regulatory cost barriers for all jurisdictions divided by the number of jurisdictions with one or more regulatory cost barrier.

[xxix] U.S. Census of Construction 2006, New Detached One-Family Housing Units Sold by Price per Square Foot, downloaded from http://www.census.gov/const/C25Ann/soldpricesqftdetach.pdf

[xxx] "On the development side, some municipalities locally are starting to require minimum lot sizes (i.e., no lots less than 60 feet wide). This type of ordinance will likely eliminate entry level housing, as land costs are ~25 percent of a house cost -- the ability to efficiently use the land over a few more lots reduces the overall cost per home." (Brilz, 2006)

[xxxi] According to Denver land planner David Clinger, as quoted a recent issue of Land Development Magazine (NAHB 2006, a) "Some cities realize that four to the acre zoning prices their own employees out of homeownership." Using non rectangular lot geometries and alternating wider and narrower lot street frontages known as "keyhole" or "zipper" type lot design, as well as judicious use of side yard use easements and creative landscaping and privacy fences, a wide range of award-wining designs have been developed for SFD homes at 7 to 10 units per acre (NAHB, 2006, b)

[xxxii] According to a King County Washington news release in Dec 2000, "The average cost of vacant urban land as a proportion of the average price of a new home has remained nearly the same over the last 20 years." downloaded from http://www.metrokc.gov/exec/news/2000/121300.htm

Appendix A
Survey of Regulatory Standards

Summary

This report presents a statistical analysis of regulatory data gathered from subdivision and zoning ordinances for the national Study of Subdivision Requirements as a Regulatory Barrier to Affordable Housing. It serves as a technical appendix to the main report that discusses the implications of regulation on housing cost in the U.S.

The broader purpose of this study is to explore the connection between subdivision and zoning regulations and housing prices. The approach of the study is to investigate regulatory standards and requirements that raise the cost of residential development. This is done by examining regulatory standards that lend themselves to direct measurement and analysis of their cost implications.

The project has several distinct parts: (1) conducting review of literature available about the topic; (2) choosing regulatory variables and collecting data on them for a nationwide representative sample of jurisdictions; (3) determining excessive values for the variables and determining the associated costs; and (4) assessing the administrative and processing costs of the regulations.

This report documents the second part of the study: data collection for specific variables for a national sample of jurisdictions. The core of the report is a descriptive analysis of the 14 variables included as part of the sample. The report presents the sampling methods and procedures for collecting the data.

METHODS

SAMPLING METHODS

This report is based on a sample of 469 local governments in the U.S. that have the authority to adopt land use regulations. The sampling challenge was to develop a methodology that resulted in a random sample that is representative of the population. The objective was to develop a sample that was (1) geographically representative of jurisdictions across the nation, (2) reflected the national distribution of population (including jurisdiction size), (3) reflected both fast and slow growing jurisdictions, and (4) represented a range of government types.

The methodology we used to draw the sample weighted the sample by population in states (e.g., the number of samples for each state is proportional to its population) and then by amount of population growth in each local government between 1996 and 2000. This methodology placed emphasis on the amount of population in each state, and ensured that both fast and slow growing governments were represented.

The sampling methodology originally intended to examine subdivision ordinances from 1,100 jurisdictions. When the Project Team began evaluating which standards to measure, we found that many of the relevant standards were in zoning ordinances, rather than subdivision ordinances. After consultation with HUD, the Project Team decided to review zoning ordinances and subdivision ordinances and to reduce the sample size to 500 jurisdictions to reflect the increased work of gathering data from multiple ordinances. We chose the smaller sample of 500 jurisdictions from the previous sample of 1,100 jurisdictions. In cases where the

ordinances could not be obtained from the jurisdiction, we used a substitution method to choose a different jurisdiction.

Analysis of the sample jurisdictions performed after data collection was completed showed that the sample is roughly representative of each state by population and geography. Jurisdictions in the sample represent 26% of the entire U.S. population.

ORDINANCE REVIEW PROCEDURES

Ordinance review consisted of five steps.

1. *Choose the residential district to review.* The first step in ordinance review was choosing the correct residential district to review. This step was the most critical step in ordinance review. The methods for choosing the zoning district are presented below.

2. *Gather data from the zoning ordinance.* The following information was generally found in the section of the ordinance that described the chosen zoning district: lot width, lot size, floor area, and setbacks. The zoning ordinance often contained landscaping requirements and off-street requirements.

3. *Gather data from the subdivision ordinance.* The following standards were generally found in the design standards section of the subdivision ordinance: sidewalk requirements, street width standards, open space requirements, and curb and gutter requirements. Some jurisdictions included landscaping or off-street parking requirements in the subdivision ordinance.

4. *Search both ordinances for missing standards.* When researchers did not find standards in the usual ordinance, they searched the other ordinance for the standards. For example, if landscaping standards were not found in the subdivision ordinance, the researcher searched the zoning ordinance for landscaping standards for the chosen zoning district.

5. *Gather administrative data.* The final step was to gather administrative data about the ordinances, such as the last date the ordinance was updated and the type of update.

METHODS FOR CHOOSING ZONING DISTRICTS

Zoning ordinances presented some inherent challenges to analysis of the variables. A typical zoning ordinance has three or more residential districts. The Project Team quickly concluded that reviewing every residential district for each jurisdiction in the sample would be infeasible. Thus, we developed a protocol for gathering standards that significantly reduced the data collection effort.

We focused our attention on the "border" zone between low-density single-family development and high-density multifamily development. These “border” zones typically had smaller minimum regulations for lot size and other lot dimension variables than other single-family zones. We focused on this zone because it presents a greater opportunity for development of affordable housing than zones that require larger lot sizes.

We chose the "border" zone based on the following characteristics: it permitted detached single-family houses outright; it had the smallest minimum lot size and setbacks; and (where

applicable) it allowed a mixture of detached single-family houses and duplexes or multifamily housing. In cases where it was unclear which zone to choose after evaluating these characteristics, we always chose the zone with the smallest minimum lot size where detached single-family homes are permitted outright.

ANALYTICAL APPROACH

The analytical approach focused on two types of statistical analysis: (1) basic descriptive analysis; and (2) means testing. The basic descriptive analysis consisted of the following statistics: mean, median, mode, frequencies, range, and standard deviation. The means testing used chi-square and ANOVA with post-hoc testing to determine if the variables varied significantly by class membership within subcomponents of the sample including government type, census region, membership in a Metropolitan Statistical Area (MSA), central city, and population quartiles. These tests showed whether and how the variables differed by these subcomponents and which differences were significant.

SUMMARY OF FINDINGS

Table 1 provides a summary of descriptive statistics for the variables reviewed in the study. The findings for each variable are discussed below.

Table 1. Summary of descriptive statistics of the variables reviewed

	N	Mean	Median	Mode	Standard Deviation	Minimum	Maximum
Minimum lot size (square feet)	419	9924	6,000	5000	16,946	750	217,800
Minimum lot width (linear feet)	342	61.92	60	50	25	20	250
Minimum front setbacks (linear feet)	413	25.15	25	25	13	0	100
Minimum side setbacks (linear feet)	417	8.257	8	5	5	0	30
Minimum rear setbacks (linear feet)	404	20.55	20	25	9	0	65
Minimum floor area (square feet)	86	1060	1,000	1000	359	500	2,500
Minimum off-street parking spaces	367	1.878	2	2	1	0	4
Minimum open space requirements							
Percent of total land in subdivision	47	13.1	10	10	9	3	50
Number of square feet per dwelling unit	18	1562	795	871	3,447	310	15,246
Number of square feet per person	34	229.4	218	218	112	87	436
Minimum sidewalk width (linear feet)	153	4.487	4	4	1	3	10
Minimum planting strip width (linear feet)	37	4.608	5	5	1	2	8
Minimum street pavement width (linear feet)	192	27.81	28	30	6	16	45
Minimum street right-of-way width (linear feet)	262	52.24	50	50	8	20	80

Source: Survey of Regulatory Standards, CPW 2006

Most of the 469 jurisdictions reviewed had zoning and subdivision ordinances. Eighty-three percent of the jurisdictions had both zoning and subdivision ordinances. Six percent of jurisdictions only had zoning ordinances, 4% of jurisdictions only had subdivision ordinances, and 6% of jurisdictions had neither ordinance. The jurisdictions with neither ordinance were included in the study to represent jurisdictions with less regulation.

Lot size requirements were highly variable among jurisdictions. The smallest minimum lot size in the study was 750 square feet and the largest was 217,800 square feet (5 acres). Forty-one percent of the jurisdictions in the sample had minimum lot sizes between 5,000 and 6,999 square feet. Statistical testing showed significant differences in lot size

requirements for each subcomponent of the sample. This indicated that there were fundamental differences in minimum lot sizes for each of the subcomponents of the sample. For example, there were significant differences in minimum lot sizes for each of the four Census regions (one of the subcomponents of the sample), with larger minimum lot sizes in the Northeast than in the other three regions.

Lot widths varied across jurisdictions. The smallest lot width requirement was 20 feet, the largest 250 feet, and the median 60 feet. Fifty-five percent of jurisdictions required minimum lot widths of 50 to 69 feet. As with lot sizes, statistical testing showed significant differences in lot width requirements for each subcomponent of the sample.

The mean front setback requirement was 25 feet. Fifty-six percent of jurisdictions had front setbacks between 20 to 29 feet. Like lot size and width, front setbacks differ in a significant way for each subcomponent of the sample.

The mean side setback requirement was eight feet per side.. Fifty-eight percent of jurisdictions required minimum side yard setbacks of between five to nine feet. Side setbacks differed in significant ways for each subcomponent of the sample.

The mean rear setback was 21 feet. The smallest requirement for a rear setback was zero feet and the largest was 65 feet. Fifty-five percent of jurisdictions required rear setback of between 20 to 29 feet. Rear yard setbacks differed in significant ways for each of the five subcomponents of the sample, except for population quartiles.

Fewer than 20% of jurisdictions had minimum floor area requirements. For these, the mean floor area was 1,060 square feet and the median 1,000 square feet. The smallest floor area requirement was 500 square feet per dwelling unit and the largest 2,500 square feet.

More than three-quarters of the jurisdictions required two off-street parking spaces. For these, the mean number of off-street parking spaces required per dwelling unit was 1.88 and the median was 2 parking spaces. Further statistical testing showed that the number of off-street parking spaces required differed in a significant way based on population quartile, as well as between central cities and non-central cities.

Fewer than half of the jurisdictions had landscaping standards. Forty-two percent of the jurisdictions had landscaping standards specifically for subdivisions or the zoning district that we examined for the study. Differences in landscaping requirements were significant for the following subcomponents of the sample: Census region, whether the jurisdiction is part of an MSA, and population quartile.

Open space standards show substantial variation. We collected three types of requirements for open space: (1) percent of total land in the subdivision, (2) number of square feet per dwelling unit, and (3) number of square feet per person. About 20% of the jurisdictions in the sample used one of these methods for determining open space requirements.

Fifty-one percent of jurisdictions explicitly required sidewalks. Twenty-six percent of all jurisdictions required sidewalks on both sides of the street. The average sidewalk width

was four feet. Requirements for sidewalks varied in a significant way by the following subcomponents of the sample: government type, whether the jurisdiction is part of an MSA, and the jurisdiction's population. In contrast, sidewalk width requirements did not vary significantly based on any of the subcomponents of the sample.

Relatively few (8%) jurisdictions had requirements for planting strips. The planting strip is a landscaped area between the sidewalk and curb. The mean and median planting strip width was five feet.

Curbs and gutters were required by 50% of the jurisdictions in the study.

The mean and median pavement width for streets was 28 feet. Most jurisdictions' standards for pavement width were either 20 to 24 feet wide, 25 to 29 feet wide, or 30 to 34 feet wide. Pavement width differed in a significant way for each subcomponent of the sample.

The mean street right-of-way was 52 feet. Fifty-six percent of jurisdictions with right-of-way standards require right-of-ways no smaller than 50 to 54 feet and 24% of jurisdictions require right-of-ways at least 60 to 64 feet wide. Street right-of-way requirements varied significantly by Census region.

GENERAL OBSERVATIONS ABOUT DATA COLLECTION AND ANALYSIS

The following section presents observations about the data collection and analysis phases of the survey of regulatory standards.

Most jurisdictions regulated one or more of the variables. Ninety-four percent of the jurisdictions in the sample had standards for one or more of the study variables. More than three-quarters of the jurisdictions had standards for lot size, front setbacks, and off-street parking spaces. About one-fifth of the jurisdictions had standards for open space and floor area.

The population varied among jurisdictions. The size of jurisdictions within the sample varied substantially. They ranged in population from 9.5 million people to 132 people, from some of the largest cities and most densely developed counties in the U.S. to small rural towns. These differences presented challenges in analyzing the regulatory standards. We addressed these challenges by separating the sample into population quartiles and comparing regulatory standards among the quartiles.

Some of the variables had a broad range of values. This indicates that jurisdictions are applying a wide range of regulatory standards. The basic statistical analysis showed that several of the variables had substantial variation. The following variables had a large range of values and large standard deviation compared to their mean: lot size, lot width, front setback, side setback, and open space. For example, a rural jurisdiction is likely to have larger minimum requirements for lot size and lot width than an urban city. We addressed these differences by separating the sample subcomponents and comparing regulatory standards within the subcomponent groupings. The subcomponents included government type, census region, membership in a Metropolitan Statistical Area (MSA), and central city.

Introduction

This report presents a statistical analysis of regulatory data gathered from subdivision and zoning ordinances for the national Study of Subdivision Requirements as a Regulatory Barrier to Affordable Housing. It serves as a technical appendix to the main report that discusses the implications of regulation on housing cost in the U.S. This report begins with an overview of the study—the context and the research approach. It then describes characteristics of the sample of zoning and subdivision regulations from 469 local governments. The core of the report is a descriptive analysis of the 14 variables included as part of the sample. It discusses the implications of the sample in the context of the broader study. This report also includes a number of appendices that describe the sampling methods and procedures.

BACKGROUND

This study is designed to assess, on a nationwide scale, the occurrence and magnitude of land use controls as regulatory barriers to building affordable housing. To date there is only local and regional research available on the topic, much of which is outdated. Prior studies have focused on the effect of regulatory barriers to affordable housing from a broad perspective. For instance, *Not In My Backyard: Removing Barriers to Affordable Housing*, published by the President's Advisory Commission in 1991, found that exclusionary, discriminatory, and unnecessary regulations were significant barriers to affordable housing. According to that study, these barriers deter the development of housing within the means of lower-income, and increasingly middle-income "work force" families.

The regulations that this study focused on are generally found in subdivision and zoning ordinances. Subdivision and zoning regulations can increase the cost of housing through setting excessive standards for development, such as lot size or street width. Until now, there had been no nationwide study that explores the impact of these specific regulations on the affordability of housing.

Subdivision and zoning ordinances are used by jurisdictions to regulate development. The ordinances serve different purposes in the development process.

- **Subdivision ordinances** regulate the division of land for development, most frequently for residential purposes. Subdivision ordinances generally include two types of requirements: (1) administrative procedures and requirements for dividing land into smaller lots and (2) standards for developing shared infrastructure, such as streets and sidewalks, within the area of development.

- **Zoning ordinances** regulate development by dividing the jurisdiction into multiple zones, based on compatible uses. For example, a jurisdiction may have several different zones for residential development, each geared towards different densities of residential development. Zoning ordinances include many types of regulation and requirements. This study focuses on the requirements found in the densest residential zone that permits development of detached single-family housing outright. This zone represents the "border" between multi-family housing and low-density single-family housing. The requirements for less land in this zone increase the likelihood of affordable housing being developed in this zone because land accounts for a substantial share of the costs of residential development.

- The United States Department of Housing and Urban Development (HUD) contracted with the National Association of Homebuilders (NAHB) Research Center to conduct this study. The NAHB assembled a Project Team to investigate this issue, which included the National Center for Smart Growth Research and Education at the University of Maryland and ECONorthwest. ECONorthwest contracted with the Community Planning Workshop (CPW) to conduct the data collection portion of the study. This technical appendix was written by CPW and ECONorthwest.

PURPOSE

The broader purpose of this study is to explore the connection between subdivision and zoning regulations and housing prices. The approach of the study is to investigate regulatory standards and requirements that raise the cost of residential development. This is done by examining regulatory standards that lend themselves to direct measurement and analysis of their cost implications.

The project has several distinct parts: (1) conducting review of literature available about the topic, (2) choosing regulatory variables and collecting data on them for a nationwide representative sample of jurisdictions, (3) determining excessive values for the variables and determining the associated costs, and (4) assessing the administrative and processing costs of the regulations.

This report documents the second part of the study, data collection for specific variables for a national sample of jurisdictions. The report presents the methodology for collecting the data, as well as a descriptive analysis of the variables. Specifically this report presents:

- Protocol and methods used to obtain the data
- Characteristics of the sample as compared to all jurisdictions in the U.S.
- Descriptive analysis of each variable included in the study
- Discussion of deviation among jurisdictions for each variable
- Comparisons of geographic regions, jurisdiction types, and population for selected variables

MEASURING REGULATORY STANDARDS

The Project Team worked together to design and execute the data collection portion of the study. This part of the study involved the following components:

- **Choosing the variables.** This involved creating a list of land use regulatory variables that contribute to construction costs and evaluating whether these variables are found in subdivision ordinances. During the design phase we found that some of the variables that contribute the most to residential development costs are found in zoning ordinances, rather than subdivision ordinances. As a result, we chose to expand the study to include these zoning standards. This process is summarized in Appendix 1.

- **Sampling methodology.** One goal of the study was to produce conclusions that can be applied to the entire U.S. An essential part of this task was to creating a representative nationwide sample of jurisdictions to include in the data collection portion of the study.

- **Collecting ordinances.** Ordinance collection was an essential task for the study.

- **Ordinance review.** Ordinance review involved locating the variables in either the subdivision or zoning ordinance and choosing the minimum values for each variable. We focused on regulations impacting development of new single-family detached dwellings, especially development in subdivisions.

- The steps above resulted in a sample of 469 local governments with the authority to adopt land use regulations.

ORGANIZATION OF THE REPORT

The remainder of this report is organized as follows:

Chapter 2: Characteristics of the sample presents information about the sample, including a summary of the sampling methods used to choose jurisdictions, variations among ordinances, and comparisons of the sample with all local governments in the U.S.

Chapter 3: Descriptive analysis of variables from sample jurisdictions presents analysis of the variables taken from the ordinances. The analysis includes lot standards, landscaping standards, open space standards, and street standards.

Chapter 4: Observations presents our general observations about the variables and study.

This report also contains an **Appendix 1: Choice of review variables** summarizes the variables used in the project and the reasons for including each variable.

CHARACTERISTICS OF THE SAMPLE

The Project Team developed a sampling methodology to choose a nationwide representative sample of jurisdictions. This chapter contains a description of the sample and the methods used to draw the sample. The chapter is separated into the following sections: a summary of methods, a comparison of the sample against all jurisdictions in the U.S., and a description of the ordinances in the sample.

SUMMARY OF METHODS

This section provides short summaries of our sampling methods and our the method for choosing zoning districts for the study.

SAMPLING METHODS

This report is based on a sample of 469 local governments in the U.S. that have the authority to adopt land use regulations. The sampling challenge was to develop a methodology that resulted in a random sample that is representative of the population. The objective of this exercise was to develop a sample that was (1) geographically representative of jurisdictions across the nation, (2) reflected the national distribution of population (including jurisdiction size), (3) reflected both fast and slow growing jurisdictions, and (4) represented a range of government types.

According to the U.S. Census of Local Governments, 38,966 governmental entities existed in 2002 that had the authority to develop and adopt subdivision regulations. These local governments represent the population of interest in this study. Further evaluation of the data indicates that local governments are far from being evenly distributed through the U.S. Moreover, the geographic distribution of local governments is significantly different than the geographic distribution of population. Thus, weighting the sample by the number of governmental entities would result in a sample that had a much higher proportion of small jurisdictions.

The methodology we used to draw the sample weighted the sample by population in states (e.g., the number of samples for each state is proportional to its population) and them by amount of population growth in each local government between 1996 and 2000. This methodology placed emphasis on the amount of population in each state, and ensured that both fast and slow growing governments were represented.

The sampling methodology originally intended to examine subdivision ordinances from 1,100 jurisdictions. When the Project Team began evaluating which standards to measure, we found that many of the relevant standards were in zoning ordinances, rather than subdivision ordinances. After consultation with HUD, the Project Team decided to review zoning ordinances and subdivision ordinances and to reduce the sample size to 500 jurisdictions to reflect the increased work of gathering data from multiple ordinances. We chose the smaller sample of 500 jurisdictions from the previous sample of 1,100 jurisdictions. In cases where the ordinances could not be obtained from the jurisdiction, we used a substitution method to choose a different jurisdiction.

By the time we made the decision to reduce the number of jurisdictions in the study, we had already pulled a sample of 1,100 jurisdictions. We selected the 500 jurisdictions from the

1,100 jurisdictions. We separated the process of choosing jurisdictions into two parts: (1) we chose the two largest jurisdictions in each state to ensure that each state was represented in the study and (2) we chose the remaining 400 jurisdictions randomly from the remaining 1,000 jurisdictions.

In cases where we were unable to obtain the ordinances from the jurisdiction, we used a substitution method to choose a different jurisdiction. In short, we returned to the remainder of the sample of 1,100 jurisdictions and chose a new jurisdiction from the same state, with a similar size and government type if possible.

COMPARISON OF THE SAMPLE WITH ALL JURISDICTIONS IN THE U.S.

A comparison of the jurisdictions included in the sample provides an indication of whether the sample is representative of all governments in the U.S. If it is not representative, this comparison should show the ways that the sample is not representative. This section includes comparisons of the sample against the entire U.S. for the following: jurisdictions by type of government, jurisdictions by region, jurisdictions by state based on population, and jurisdictions' population by region.

It is worth reviewing the sampling priorities since they determined the characteristics of the sample. The sample was weighted by the following factors for each jurisdiction:

1. Population
2. Growth rate
3. Geographic representation (each state got at least 2 samples regardless of population)

Note that the key weighting criteria did *not* include the number of local governments. If we had used the number of local governments as a weighting criteria, then states such as North Dakota that have a lot of local governments would have had many more samples that states like California that have far fewer local governments. We focused on jurisdictions' population and growth rate rather than the type of local government because the focus of the study is the cost of excessive regulation on new development, which occurs more frequently in areas with more population and higher growth rates.

Table 2-1 shows the total number of each government type in the U.S. and the study sample, as well as the percentage differences. The table shows that the study sample over-represents cities and under-represents townships. To a lesser degree, villages and towns are also underrepresented. The main reason that townships, towns, and villages are underrepresented in the sample is that our sampling methodology favored geographic diversity and population distribution over government type. This finding is consistent with the sampling methodology described above.

Table 2-1. Comparison between the number and proportion of the types of governments in the United States and the study sample

Government type	U.S.		Study Sample		Percent difference
	Number	Percent	Number	Percent	
Borough	1,233	3.2%	7	1.5%	-1.7%
Charter Township	126	0.3%	4	0.9%	0.5%
City	10,048	25.8%	258	55.0%	29.2%
City and Borough	3	0.0%	0	0.0%	0.0%
City and County	5	0.0%	3	0.6%	0.6%
City/Parish	2	0.0%	0	0.0%	0.0%
Civil Township	5	0.0%	0	0.0%	0.0%
Consolidated Government	3	0.0%	0	0.0%	0.0%
Corporation	2	0.0%	0	0.0%	0.0%
County	2,963	7.6%	47	10.0%	2.4%
Metropolitan Government	3	0.0%	1	0.2%	0.2%
Municipality	4	0.0%	1	0.2%	0.2%
Parish	60	0.2%	1	0.2%	0.1%
Plantation	35	0.1%	0	0.0%	-0.1%
Town	7,973	20.5%	77	16.4%	-4.0%
Township	12,759	32.7%	44	9.4%	-23.4%
Unified Government	2	0.0%	1	0.2%	0.2%
Urban County Government	1	0.0%	1	0.2%	0.2%
Village	3,740	9.6%	24	5.1%	-4.5%
Total	**38,967**	**100.0%**	**469**	**100.0%**	**0.0%**

Source: U.S. Census and Source: Survey of Regulatory Standards, CPW 2006

Note: The selection of the jurisdictions is not proportionate between different government types for the U.S. and the sample because our sampling methods placed a stronger emphasis on geography and jurisdiction size than government type.

Table 2-2 shows the number of jurisdictions in each Census region for the entire U.S. and the study sample. The South and West make up a higher proportion of jurisdictions in the study sample than in the entire U.S. The South has the greatest representation in the sample, with 164 jurisdictions. The Northeast has the least representation in the sample, with 84 jurisdictions. This is proportionate to the region's share of the total number of jurisdictions in the U.S. The Midwest has the greatest number of jurisdictions in the U.S. (56%), but its representation in the sample is proportionately smaller (23%). The selection of the jurisdictions is not proportionate between different regions within the U.S. and the sample because our sampling methods placed a stronger emphasis on jurisdiction size than geographic distribution.

Table 2-2. Number and percentage of jurisdictions by region for the U.S. and the study sample

	U.S.		Sample	
	Number	Percent	Number	Percent
Northeast	6,440	17%	84	18%
South	7,898	20%	164	35%
Midwest	21,918	56%	109	23%
West	2,710	7%	112	24%
Total	**38,966**	**100%**	**469**	**100%**

Source: U.S. Census and Study of Subdivision Requirements as a Regulatory Barrier to Affordable Housing Descriptive Analysis, CPW 2006

Note: The selection of the jurisdictions is not proportionate between different regions within the U.S. and the sample because our sampling methods placed a stronger emphasis on jurisdiction size than geographic distribution.

The sampling methodology was designed to draw a sample of jurisdictions based on the states' populations, proportionate to the U.S. population. The exception was that, to ensure geographic diversity, we chose two jurisdictions from each state, regardless of population. Proportionate to each state's population, five states were under-represented by at least three jurisdictions in the sample: Florida, New York, Ohio, Pennsylvania, and Texas. One reason for this under-representation is the fact that some jurisdictions were not responsive to our attempts to obtain their ordinances.[1] Another explanation for the under-representation is that every state had a minimum of two jurisdictions in the sample, which redistributed jurisdictions from states with larger populations to states with small populations.

Table 2-3 shows the 2000 Census population and percentage by region for the U.S. and the study sample. The study sample represents 26% of the entire U.S. population. The region with greatest representation by population in the sample is the West, with 39% of the population in the sample. Population in the West is over represented in the sample and population in the South and Midwest are underrepresented in the sample. One explanation for this discrepancy is that six of the thirteen jurisdictions in the sample with greater than 1 million residents are located in the West, including Los Angeles County, which has approximately 9.5 million residents.

[1] We chose substitute jurisdictions to replace the unresponsive jurisdictions but were unable to contact some of the substitute jurisdictions. We stopped substituting jurisdictions near the end of data collection because there was not enough time to obtain and review ordinances for additional substitute jurisdictions.

Table 2-3. Number and percent of population per region for the U.S. and the study sample, 2000

	U.S.		Sample	
	Persons	**Percent**	**Persons**	**Percent**
Northeast	53,594,378	19%	12,843,013	17%
South	100,236,820	36%	19,937,361	27%
Midwest	64,392,776	23%	12,108,851	16%
West	63,197,932	22%	29,163,713	39%
Total	**281,421,906**	**100%**	**74,052,938**	**100%**

Source: U.S. Census and Study of Subdivision Requirements as a Regulatory Barrier to Affordable Housing Descriptive Analysis, CPW 2006

Note: The figures for the sample population in Table 2-3 are approximations because the sample had some instances where a county and a jurisdiction within the county were included in the sample. In those cases, we subtracted the population for the jurisdiction but counted the rest of the county's population.

CHARACTERISTICS OF THE ORDINANCES

The ordinances that we reviewed varied in a number of ways, including: whether the jurisdiction had both subdivision and zoning ordinances, the last date the ordinances were modified, the type of update, and the media the ordinance was available in. This section describes these differences among the ordinances.

Our sample included 500 jurisdictions, and CPW was able to perform ordinance reviews for 469 of them. We were unable to obtain ordinances for the remaining 31 jurisdictions, many of which were substitute jurisdictions. We chose to stop attempting to collect ordinances towards the end of the ordinance review process because it took several weeks to receive the requested ordinances. The main problem in obtaining ordinances was that some jurisdictions did not have their ordinances available on the Internet and were unresponsive to our attempts at contact.

In some cases, staff at the jurisdictions that we contacted indicated that they did not have a subdivision and/or zoning ordinance. We included these jurisdictions in the review because the lack of regulation for particular standards could affect housing affordability.

Table 2-4 shows 83% of the jurisdictions had both ordinances. Six percent of the jurisdictions only had a zoning ordinance and 4% of the jurisdictions only had a subdivision ordinance. Twenty-seven (6%) had neither a subdivision nor a zoning ordinance.

Table 2-4. Jurisdictions with ordinances

	Number	**Percent**
Both ordinances	391	83%
Zoning only	30	6%
Subdivision only	21	4%
Neither ordinance	27	6%
Total jurisdictions	**469**	**100%**

Source: Survey of Regulatory Standards, CPW 2006

One indication that the ordinances are frequently used or that there has been development activity is the frequency of ordinance updates. Table 2-5 shows the date that the ordinances were last updated or adopted. The oldest zoning ordinance in our sample was last updated in

June 1966. The most recently updated zoning ordinance was updated in November 2005. Most zoning ordinances in our sample have been updated since April 2003.

The subdivision ordinances were generally not updated as recently as the zoning ordinances. The oldest subdivision ordinance in our sample was updated in January 1950, and the most recent update was December 2005. Most subdivision ordinances in our sample have been updated since February 2001.

Table 2-5. Date that the ordinances were last updated or adopted

	Date
Zoning ordinances	
Date last updated	
Oldest	June 1966
Most recent	November 2005
Mean date	December 1999
Median date	April 2003
Subdivision ordinances	
Date last updated	
Oldest	January 1950
Most recent	December 2005
Mean date	April 1997
Median date	February 2001

Source: Survey of Regulatory Standards, CPW 2006

We also collected information about the type of ordinance update. If the ordinance has not been updated since adoption, we classified the ordinance as "adopted." If the ordinance had been updated since adoption, we classified the ordinance as "amended." In some cases, we were unable to determine the type of update and left this data blank. We experienced this problem most frequently in cases where the subdivision or zoning ordinances were a part of a larger ordinance, such as a unified development code. In these cases, we frequently only had the zoning and/or subdivision sections of the larger ordinance and could not determine the data of last update and/or the type of update.

Table 2-6 shows the most recent type of update for the ordinances. Forty-five percent of the zoning ordinances in the sample were amended, while 22% were not updated since adoption. We were unable to determine the type of update for the remaining 33% of zoning ordinances. Thirty-eight percent of the subdivision ordinances were amended and 24% remained as adopted. We were unable to determine the type of update for the remaining 37% of subdivision ordinances.

Table 2-6. Ordinance last update

	Number	Percent	% of Total Sample
Zoning ordinances			
Adopted	101	32%	22%
Amended	211	68%	45%
Total	312		67%
Subdivision ordinances			
Adopted	114	39%	24%
Amended	180	61%	38%
Total	294		63%

Source: Survey of Regulatory Standards, CPW 2006

We collected electronic copies of the ordinances where possible. Table 2-7 shows the type of media for each ordinance, either electronic or paper. Of the jurisdictions with a zoning ordinance, 77% of the ordinances were available in electronic form and 23% were only available in paper form. Of the jurisdictions with a subdivision ordinance, 73% of the ordinances were available in electronic form and 27% were only available in paper form.

Table 2-7. Ordinance media

	Number	Percent	% of Total Sample
Zoning ordinances			
Electronic	326	77%	70%
Paper	95	23%	20%
Total	421		90%
Subdivision ordinances			
Electronic	294	73%	63%
Paper	109	27%	23%
Total	403		86%

Source: Survey of Regulatory Standards, CPW 2006

Note: The total for "% of Total Sample" does not equal 100% because not all jurisdictions in our sample had both ordinances, as noted previously.

In summary, the study sample was geographically diverse and represented at least two jurisdictions from each state. Cities were over-represented in the sample and villages, towns, and townships under-represented.

The study sample consisted of 469 jurisdictions, 83% of which had both a zoning and subdivision ordinance. More than half of the ordinances that gave the data of last update were last modified within the last five years. And about three-quarters of ordinances were in electronic form.

One final note: the researchers from the Community Planning Workshop at the University of Oregon found it surprisingly difficult and time consuming to obtain and compile ordinances for review. The initial hypothesis was that the majority of ordinances would be easy to find on-line. This was far from the case. Researchers considering such samples in the future are encouraged to provide plenty of time and budget for the seemingly simple process of finding and obtaining ordinances. In addition, not all ordinances available in electronic format are easy

to work with. CPW found a surprising number of ordinances that were in html or pdf format and were published section-by-section, or page by page in separate files.

Analysis of Variables

This chapter presents an analysis of the variables collected from zoning and subdivision ordinances. It represents the core of this report and the basis for the cost estimates that are the overarching objective of this study. The categories of variables in this study include: lot standards, landscaping standards, open space standards, sidewalk standards, and street standards.

ANALYTICAL FRAMEWORK

Our analytical approach focused on two types of analysis: (1) basic descriptive analysis, and (2) inferential statistics in the form of means testing. The basic descriptive analysis consisted of the following statistics: mean, median, mode, frequencies, range, and standard deviation. The means testing consisted of using chi-square and ANOVA tests.

The means tests showed statistically significant[2] differences among the jurisdictions. We separated the jurisdictions by certain characteristics, such as population size or whether the jurisdiction belonged to an MSA. These groupings, which represent subcomponents of the sample, allowed us to perform the means testing between the subcomponents of the sample, rather than the entire sample. This was helpful because the types of statistical tests we used work best when there is little variation within the sample and the descriptive analysis showed that the data had substantial variation. In other words, grouping the jurisdictions by subcomponents created more homogenous groups and allowed for comparisons of the standards within the subcomponents. The subcomponents included:

- **Government type**: We separated government types into six categories: county, city, town, township, village, and other government types. We combined counties and parishes because there are few parishes, and they serve a similar function as counties. We combined all the other government types presented in Table 2-1 because they made up less than 3% of the governments in the study.

- **Census region:** We grouped states into the four regions used by the U.S. Census: Northeast, Midwest, South, and West.[3]

- **Part of an MSA:** We grouped jurisdictions by whether they are a part of a Metropolitan Statistical Area (MSA), as defined by the U.S. Census. Jurisdictions belonging to a MSA are more likely to be located in an area where the population is densely distributed.

[2] For the remainder of the chapter, we refer to "statistically significant" results as "significant."

[3] The U.S. Census groups states by region in two ways. One grouping method is by four regions, which include: the Northeast, Midwest, South, and West. The other grouping method divides the four regions into nine divisions, which include: New England, Middle Atlantic, South Atlantic, East South Atlantic, West South Central, East North Central, West North Central, Mountain, and Pacific. This study uses the four regions to group states.

- **Central city:** We grouped jurisdictions based on whether they are a central city, as defined by the U.S. Census. A central city is the largest city of a Metropolitan Area (MA) and is a basis for establishment of an MA. Jurisdictions that are a central city are typically more densely populated than jurisdictions that are not a central city.

- **U.S. population:** We grouped the sample jurisdictions into quartiles based on their populations from the 2000 U.S. Census. The groups were as follows: fewer than 5,491 people; 5,492 to 25,176 people; 25,177 to 97,268 people, and more than 97,268 people.[4]

The means tests allowed us to determine if the variables varied in a significant pattern by class membership within certain subcomponents of our sample. In other words, the means testing indicated whether sample subcomponents, such as government type or Census region, make a difference in the standards that jurisdictions establish. For example, the means testing tells whether a variable such as lot size is likely to be different if the government is a city or county or if it is located in the east or west, etc. We used two forms of means testing: chi-square and ANOVA.

We performed chi-square tests on each variable using the five subcomponents of the sample. The chi-square indicated which variables had significant differences for the subcomponents of the sample. It is likely that significant[5] differences were caused by differences in the variables for the subcomponents. In other words, if the chi-square for lot size by government type is significant, then it is likely that lot size varied in a significant pattern by government type.

We then performed an ANOVA with a Bonferroni post-hoc test to identify which subcomponents had significant differences. This type of test required subcomponents with three or more categories. In our data, qualifying subcomponents included: government type, census region, and population. It also required continuous data in the variables. Where the chi-square test can indicate a significant difference among all of the subcomponents, the ANOVA with a Bonferroni post-hoc test can show the significant differences between each of the subcomponents. For example, this test might show that lot sizes are statistically different in cities than in counties.

In cases where we found standards for the variables in fewer than 100 jurisdictions, we did not perform any means testing because we had too little data to produce meaningful results.

METHODS FOR CHOOSING ZONING DISTRICTS

Zoning ordinances presented some inherent challenges to the standards analysis. A typical zoning ordinance has three or more residential districts. The Project Team quickly concluded that reviewing every residential district for each jurisdiction in the

[4] We created four quartiles for population of jurisdictions within the sample. Each quartile is comprised of 25% of the jurisdictions in the sample. The first quartile had jurisdictions with 5,491 or fewer residents. The second quartile had populations of 5,492 to 25,176. The third quartile had jurisdictions with populations of 25,177 to 97,268. And the fourth quartile had jurisdictions with 97,269 or more residents.

[5] When we use the term "significant" in the context of a statistical analysis, we mean "significant."

sample would be infeasible. As a result, we developed a protocol for gathering ordinances that significantly reduced the data collection effort.

The review of each jurisdiction's zoning requirements was based on the standards from one zone in the zoning ordinance. The reason that we focused on one zoning ordinance is that most jurisdictions have three or more zoning districts that allow for single-family housing development, each with different requirements for the study variables. Collecting information about each of these zones was not practical because of the amount of time and resources involved in doing so. Instead, we focused our attention on the "border" zone between low-density single-family development and high-density multifamily development. The "border" zone generally allowed a mixture of high-density single-family dwellings with duplexes and multifamily dwellings.

We chose the "border" zone based on the following characteristics: it outright permitted detached single-family houses; it had the smallest minimum lot size and setbacks; and (where applicable) it allowed a mixture of detached single-family and duplexes or multifamily housing. In cases where it was unclear which zone to choose, we always selected the zone with the smallest minimum lot size that outright permitted detached single-family housing. We focused on the "border" zone because the land requirements are smaller, which should result in lower housing costs.

LOT STANDARDS

The Project Team collected seven lot-related variables, including minimums for: lot size, lot width, front yard setbacks, side yard setbacks, rear yard setbacks, floor area, and off-street parking. In all cases, we took standards from the densest zone that outright permitted detached single-family dwellings. Our assumption was that housing in this zone would be more affordable than zones with larger minimum lot size requirements because land cost is a large contributor to housing costs. We used standards for interior lots, rather than corner or other lot configurations.

We found the lot variables in the zoning ordinance more than 90% of the time, with 10% of the lot variables coming from the subdivision ordinance. In most cases, the lot standards were single-point values, which we recorded in the database. In a few cases, one or more of the lot standards was given as a range or formula, which we could not record in the database. For example, several jurisdictions gave formula for calculating minimum side yard setbacks based on the lot width and other factors. In those cases, we did not record the side setbacks in the database but tracked them in a separate text document. These cases are not included in this analysis.

Table 3-1 presents summary statistics for each of the lot variables. The statistics are discussed in conjunction with each standard.

Table 3-1. Minimum lot variable summary statistics

	N	Mean	Median	Mode	Standard Deviation	Minimum	Maximum
Lot size	419	9,924	6,000	5,000	16,946	750	217,800
Lot width	342	62	60	50	25	20	250
Front yard	413	25	25	25	13	0	100
Side yard	417	8	8	5	5	0	30
Rear yard	404	21	20	25	9	0	65
Minimum floor area	86	1,060	1,000	1,000	359	500	2,500
Off-street parking	367	1.88	2.00	2.00	0.51	0.00	4.00

Source: Survey of Regulatory Standards, CPW 2006

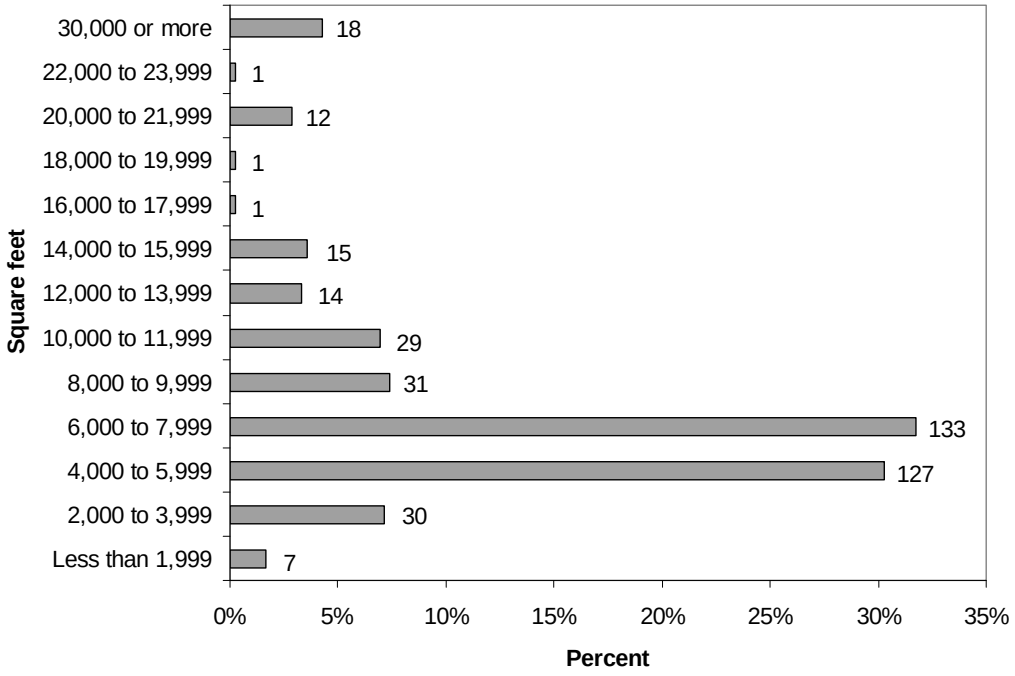
LOT SIZE

Lot size is one of the key variables in this study because the minimum lot size determines the amount of land required for a single-family detached dwelling. Most of the other lot variables are related to size and placement of the dwelling on the lot.

Lot size is the most commonly encountered standard in the study, and it has the greatest variation. We found lot size standards in 95% of the jurisdictions with zoning or subdivision ordinances. Table 3-1 shows that minimum lot size has a mean value of 9,924 square feet and a median of 6,000 square feet, with a standard deviation of 16,946 square feet. This shows that minimum lot sizes vary substantially. The smallest minimum lot size in the study was 750 square feet and the largest was 217,800 square feet (5 acres).

Figure 3-1 shows a breakdown of the minimum lot sizes, grouped in 2,000 square foot increments. About two-thirds of jurisdictions set their minimum lot sizes between 4,000 and 7,999 square feet. Only seven jurisdictions allow lots smaller than 2,000 square feet. Eighteen jurisdictions require lot sizes of at least 30,000 square feet or more.

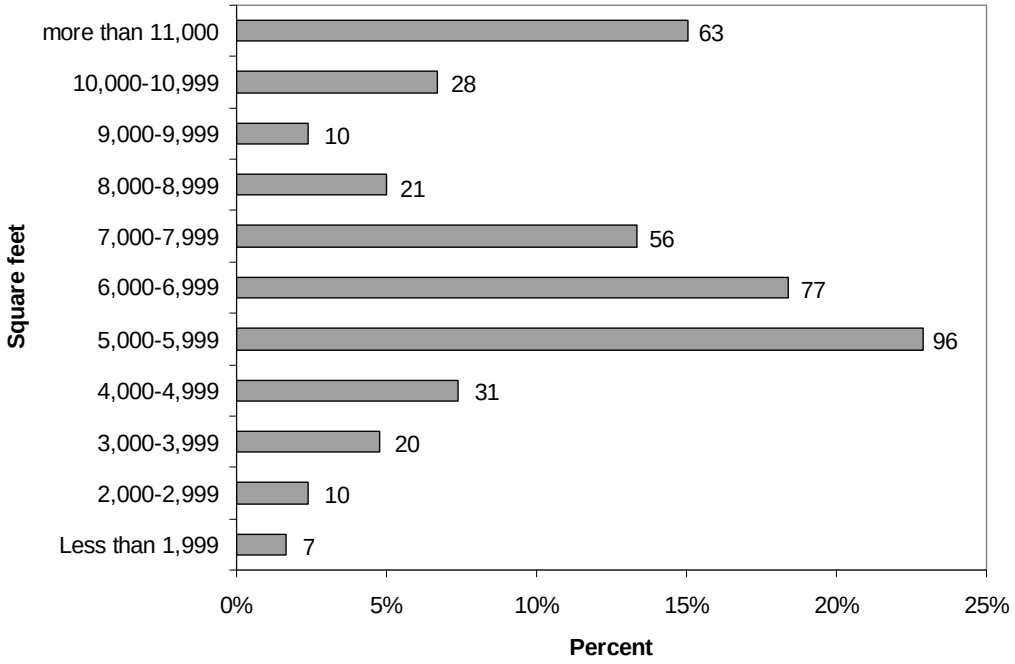
Figure 3-1. Minimum lot size requirements, percentage, and frequency, grouped by 2,000 square foot increments



Source: Survey of Regulatory Standards, CPW 2006

Figure 3-2 shows lot sizes grouped in 1,000 square foot increments. This closer examination of lot size requirements show that 23% of jurisdictions have minimum lot sizes between 5,000 and 5,999 square feet and an additional 18% of jurisdictions allow lots between 6,000 and 6,999 square feet.

Figure 3-2. Minimum lot size percentage and frequency, grouped by 1,000 square foot increments



Source: Survey of Regulatory Standards, CPW 2006

Table 3-2 shows the results of statistical analysis of lot size compared to the five subcomponents. The significance level column describes the statistical relationship between the variable and each subcomponent of the sample. A significance level of less than 0.05 is considered significant. If the significance level is less than 0.05, we have entered "yes" in the "statistically significant difference" column, and if it is greater than 0.05, we have entered "no." The analysis shows that lot size is statistically different for each subcomponent of the sample.

Table 3-2. Statistical comparisons of lot sizes for jurisdictions grouped by subcomponents of the sample

	Statistically significant difference	Significance level
Government type	Yes	0.000
Census region	Yes	0.000
Part of MSA / Not part of MSA	Yes	0.000
Central city / Not central city	Yes	0.000
U.S. Population grouped in quartiles	Yes	0.000

Source: Survey of Regulatory Standards, CPW 2006

Further, statistical testing shows the differences in lot sizes among subcomponents of the sample.[6] The differences observed within both types of means testing reinforce the conclusion that statistical differences result from differences in lot size within the subcomponents. Lot size varies within each subcomponent in the following ways:

- **Government type** City lot sizes are significantly smaller than county, town, and township lot sizes.

- **Census region** Lot sizes in the Northeast are statistically larger than lot sizes in the other three regions.

- **U.S. population** Lot sizes in the first quartile, jurisdictions with the fewest people, are statistically larger than lot sizes in other quartiles.

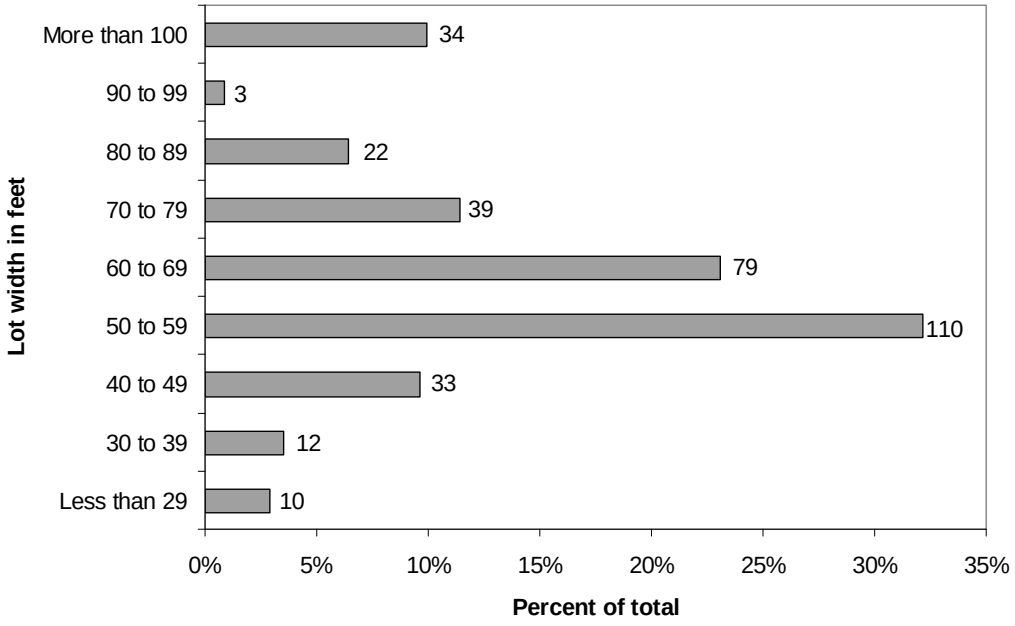
LOT WIDTH

Lot widths varied across jurisdictions but not as greatly as lot size. Table 3-1 shows that 342 or about 77% of jurisdictions with ordinances had minimum lot width standards. The mean lot width requirement was 62 feet and the median was 60 feet, with a standard deviation of 25 feet. The smallest lot width requirement was 20 feet and the largest was 250 feet.

Figure 3-3 shows lot widths in 10-foot increments. Most jurisdictions with minimum lot widths require lot widths of at least 50 to 69 feet. Thirty two percent of jurisdictions require minimum lot widths of 50 to 59 feet and 23% of jurisdictions require lot width minimums between 60 to 69 feet. Three percent of jurisdictions have minimum lot widths of less than 30 feet and 10% require lot widths of more than 100 feet.

[6] This form of statistical testing, an ANOVA with a Bonferroni post-hoc test, required a minimum of three groups within the subcomponent. We conducted this test for the following subcomponents: government type, census region, and U.S. population.

Figure 3-3. Minimum lot widths percentage and frequency, grouped in 10-foot increments



Source: Survey of Regulatory Standards, CPW 2006

Table 3-3 shows statistical comparisons between lot widths and five subcomponents of the sample. A significance level of less than 0.05 is considered significant. If the significance level is less than 0.05, we have entered "yes" in the "statistically significant difference" column, and if it is greater than 0.05, we have entered "no." Like lot size, comparison of lot widths indicated significant differences within each of the five subcomponents of the sample.

Table 3-3. Statistical comparisons of lot widths for jurisdictions grouped by subcomponents of the sample

	Statistically significant difference	Significance level
Government type	Yes	0.000
Census region	Yes	0.000
Part of MSA / Not part of MSA	Yes	0.000
Central city / Not central city	Yes	0.000
U.S. Population grouped in quartiles	Yes	0.000

Source: Survey of Regulatory Standards, CPW 2006

Additional statistical testing using ANOVA shows the differences in minimum lot widths within subcomponents of the sample. These differences reinforce the conclusion that the statistical differences result from fundamental differences in lot widths within the subcomponents. Lot widths vary within each subcomponent in the following ways:

- **Government type** Lot widths are statistically different between the following groups: Cities have smaller average lot widths than villages, towns, or townships; and

counties have larger average lot widths than towns or townships. The county regulations did not generally apply to the incorporated jurisdictions located within the county.

- **Census region.** Lot widths are statistically different between the Northeast and all other regions. The Northeast has larger average lot widths than any other region. Lot widths in the Midwest are statistically larger than those in the West.

- **U.S. population.** Lot widths are statistically different between the first population quartile, jurisdictions with the fewest people, and the other quartiles. The first quartile has larger average lot widths than the other quartiles. In addition, the second quartile has significantly larger lot widths than the fourth quartile.

SETBACKS

We examined three types of setbacks in this study: front, side, and rear setbacks. In each case, we examined setbacks for interior lots.

The front yard setback is the distance from the front of the dwelling unit to the property line or street. Table 3-1 shows that 93% or 413 of jurisdictions with ordinances had minimum standards for front yard setbacks. The mean and median front setback requirement was 25 feet, with a standard deviation of 13 feet. Minimum front setbacks ranged from zero to 100 feet.

Table 3-4 shows front yard setback requirements in 5-foot increments. The majority of jurisdictions had minimum setbacks between 20 and 29 feet. Twenty-five percent of jurisdictions had minimum setbacks between 20 and 24 feet and minimum 31% of jurisdictions had setbacks of 25 to 29 feet. One percent of jurisdictions had minimum setbacks less than 9 feet and 3% of jurisdictions had minimum setbacks of 55 feet or greater.

Table 3-4. Minimum front yard setbacks in 5-foot increments

	Frequency	Percent
Less than 9	4	1%
10 to 14	31	8%
15 to 19	45	11%
20 to 24	103	25%
25 to 29	126	31%
30 to 34	49	12%
35 to 39	16	4%
40 to 44	10	2%
45 to 49	4	1%
50 to 54	13	3%
More than 55	12	3%
Total	**413**	**100%**

Source: Survey of Regulatory Standards, CPW 2006

Table 3-5 shows statistical comparisons between front yard setbacks and five subcomponents of the sample. A significance level of less than 0.05 is considered significant. If the significance level is less than 0.05, we have entered "yes" in the "statistically significant difference" column, and if it is greater than 0.05, we have entered "no." Differences in front yard setbacks were significant within each of the five subcomponents of the sample.

Table 3-5. Statistical comparisons of front yard setbacks with subcomponents of the sample

	Statistically significant difference	Significance level
Government type	Yes	0.000
Census region	Yes	0.000
Part of MSA / Not part of MSA	Yes	0.000
Central city / Not central city	Yes	0.000
U.S. Population grouped in quartiles	Yes	0.000

Source: Survey of Regulatory Standards, CPW 2006

Additional ANOVA statistical testing shows the differences in front setbacks within subcomponents of the sample. The differences observed within both types of means testing reinforce the conclusion that the statistical differences result from fundamental differences front setbacks within the subcomponents. Front setbacks vary within each subcomponent in the following ways:

- **Government type** Front setbacks are statistically different for the following groups: Counties have smaller average front setbacks than townships; and cities have smaller average front setbacks than towns, townships, and villages.

- **Census region.** The West has statistically smaller average front setbacks than any other region. The South has statistically smaller average front setbacks than the Midwest and Northeast.

- **U.S. population.** Front setbacks are statistically different between the first population quartile (the fewest people per jurisdiction) and the other quartiles. The first quartile has larger average front setbacks than the other quartiles. In addition, the second quartile has statistically larger front setbacks than the fourth quartile.

We also examined side yard setbacks for interior lots. Table 3-1 shows that 417 or 94% of jurisdictions with ordinances had minimum side yard setback requirements. The mean and median side yard setback was eight feet per side, with a standard deviation of five feet. The smallest side yard setback requirement was zero feet and the largest was thirty feet per side.

Table 3-6 shows the side yard setbacks in five-foot increments. Fifty-eight percent of jurisdictions required minimum side yard setbacks of between five to nine feet. One-quarter of jurisdictions required side setbacks between ten to fourteen feet. Six percent required minimum side setbacks of less than five feet and 3% required setbacks of greater than twenty-five feet.

Table 3-6. Minimum side yard setbacks in 5-foot increments

	Frequency	Percent
Less than 5	27	6%
5 to 9	240	58%
10 to 14	104	25%
15 to 19	24	6%
20 to 24	10	2%
More than 25	12	3%
Total	**417**	**100%**

Source: Survey of Regulatory Standards, CPW 2006

Side yard setbacks consist of a setback for each side of the yard. Most ordinances present the setbacks for one side of the yard but some ordinances present a total size for both side setbacks. Seventeen percent of the jurisdictions with side yard setback requirements presented their minimum setbacks as a total number to be divided between the two sides. For example, a jurisdiction might require ten feet of side yard setbacks between the two sides but the minimum setback on either side might be four feet. The other setback would have to be at least six feet. In these cases, we divided the combined side setback in half and recorded that number. In our example, we would record five feet as the minimum side setback.

Table 3-7 shows statistical comparisons between side yard setbacks and five subcomponents of the sample. A significance level of less than 0.05 is considered significant. If the significance level is less than 0.05, we have entered "yes" in the "statistically significant difference" column, and if it is greater than 0.05, we have entered "no." Differences in side yard setbacks were significant for each of the five subcomponents of the sample.

Table 3-7. Statistical comparisons of side yard setbacks for jurisdictions grouped by subcomponents of the sample

	Statistically significant difference	Significance level
Government type	Yes	0.000
Census region	Yes	0.000
Part of MSA / Not part of MSA	Yes	0.000
Central city / Not central city	Yes	0.000
U.S. Population grouped in quartiles	Yes	0.000

Source: Survey of Regulatory Standards, CPW 2006

Further statistical testing using ANOVA shows the differences in minimum side setbacks among subcomponents of the sample. The differences observed within both types of means testing reinforce the conclusion that the statistical differences result from fundamental differences side setbacks within the subcomponents. Side setbacks vary within each subcomponent in the following ways:

- **Government type** Side setbacks are statistically different for the following groups: Counties have smaller average front setbacks than towns and townships; and cities have smaller average front setbacks than towns, townships, and villages.

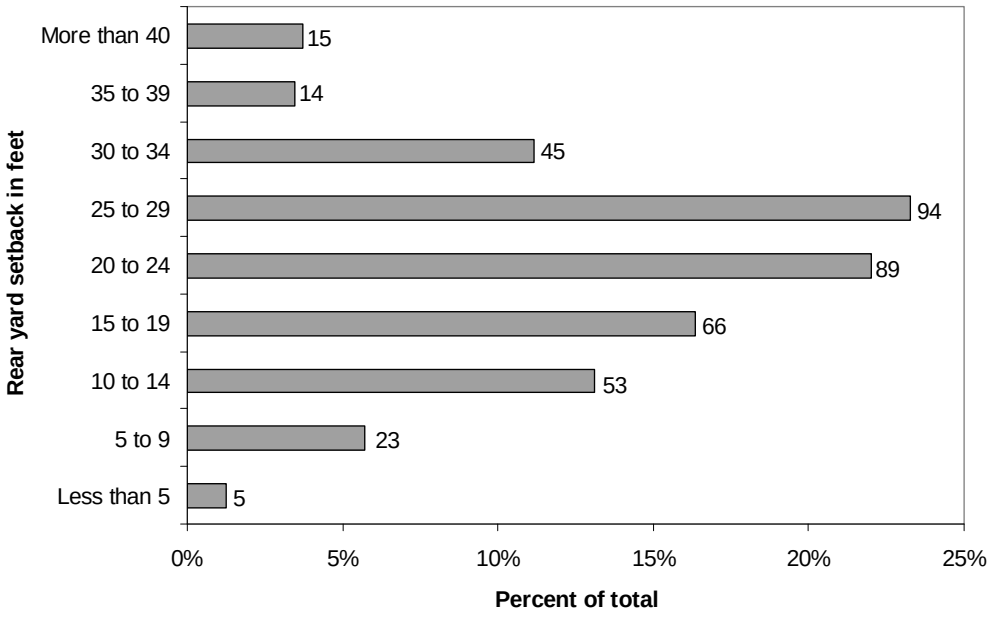
- **Census region** The Northeast has larger average side setbacks, a significant difference between the Northeast and the other regions. The West has smaller average side setbacks than any other region, which is also significant.

- **U.S. Population** The first population quartile, jurisdictions with the fewest people, have larger average side setbacks, which is significantly different from each other quartile. Likewise, the second population quartile has larger average side setbacks than the third and fourth quartiles, which is also significant.

The final type of setback was rear yard setbacks. Table 3-1 shows that 404 or 91% of jurisdictions with ordinances had minimum rear yard setback requirements. The mean rear setback was 21 feet and the median was 20 feet, with a standard deviation of 9 feet. The smallest requirement for a rear setback was zero feet and the largest was 65 feet.

Figure 3-4 shows the rear yard setback requirements in five-foot increments. The majority of rear yard setback minimums range from 15 feet to 29 feet. The most common minimum rear yard setbacks are between 20 to 24 feet (22% of jurisdictions) and 25 to 29 feet (23% of jurisdictions). One percent of jurisdictions have minimum rear setbacks of less than five feet and four percent of jurisdictions have minimum rear setbacks of greater than 40 feet.

Figure 3-4. Minimum rear yard setbacks percentage and frequency, grouped in 5-foot increments



Source: Survey of Regulatory Standards, CPW 2006

Table 3-8 shows statistical comparisons between rear setbacks and five subcomponents of the sample. A significance level of less than 0.05 is considered significant. If the significance level is less than 0.05, we have entered "yes" in the "statistically significant difference" column, and if it is greater than 0.05, we have entered "no."

The differences were significant for each of the five subcomponents of the sample, except for the jurisdictions grouped by U.S. population. This means that rear setbacks are not statistically different based on the population quartile.

Table 3-8. Statistical comparisons of rear yard setbacks for jurisdictions grouped by subcomponents of the sample

	Statistically significant difference	Significance level
Government type	Yes	0.007
Census region	Yes	0.000
Part of MSA / Not part of MSA	Yes	0.001
Central city / Not central city	Yes	0.029
U.S. Population grouped in quartiles	No	0.055

Source: Survey of Regulatory Standards, CPW 2006

Additional statistical testing using ANOVA shows the differences in minimum rear setbacks within subcomponents of the sample. The differences observed reinforce the conclusion that the statistical differences result from fundamental differences rear

setbacks within the subcomponents. Rear setbacks vary within each subcomponent in the following ways:

- **Government type** Rear setbacks are on average smaller in counties than townships, a significant difference. Cities are statistically different than towns and townships, with smaller average rear setbacks.

- **Census region** The West has significantly different rear setbacks, which are generally smaller than the other regions. The South's rear setbacks are also statistically different from other regions. The South has larger rear setbacks than the West and smaller rear setbacks than the Northeast or Midwest.

- **U.S. Population** Jurisdictions in the fourth quartile of population (having the largest populations) have smaller average setbacks than any other quartile. This difference is significant between the fourth quartile and the first and second quartiles.

FLOOR AREA

The lot variables so far are related to the size of the lot and placement of the dwelling on the lot. The next lot variable, floor area, is related to the amount of living space within the dwelling unit, expressed as the minimum number of square feet of floor space within the dwelling.

Table 3-1 shows that 86 jurisdictions or 18% of jurisdictions with ordinances had requirements for floor area. The mean floor area requirement was 1,060 square feet and the median requirement was 1,000 square feet, with a standard deviation of 359 square feet. The smallest floor area requirement was 500 square feet per dwelling unit and the largest 2,500 square feet.

Table 3-9 shows the distribution of the floor area minimum requirements. Twenty-seven percent of jurisdictions with floor area requirements required no less than 800 to 999 square feet and 24% required no less than 1,000 to 1,199 square feet. Twenty percent of jurisdictions with floor area standards had minimums less than 800 square feet and 10% required more than 1,600 square feet.

Table 3-9. Minimum floor area in square feet

	Frequency	Percent
Less than 800	17	20%
800 to 999	23	27%
1,000 to 1,199	21	24%
1,200 to 1,399	12	14%
1,400 to 1,599	4	5%
More than 1,600	9	10%
Total	**86**	**100%**

Source: Survey of Regulatory Standards, CPW 2006

We did not do statistical analysis of floor area requirements based on the five subcomponents of the sample because the number of jurisdictions in the study with floor area requirements was so small that the statistical analysis would have little meaning.

OFF-STREET PARKING REQUIREMENTS

The final lot variable was requirement of off-street parking spaces. Table 3-1 shows that 367 or 83% of the jurisdictions had off-street parking requirements. The mean number of off-street parking spaces required was 1.88 and the median was two spaces. The standard deviation was 0.51 spaces. The fewest spaces required was zero and the most spaces required was four. Off-street parking requirements were found most frequently in the zoning ordinance.

Table 3-10 shows that more than three-quarters of jurisdictions with off-street parking standards require two spaces. Sixteen percent of jurisdictions require one off-street parking space. Four percent of jurisdictions require three or four off-street parking spaces.

Table 3-10. Minimum number of parking spaces per dwelling unit

	Frequency	Percent
1 per du	57	16%
1.5 per du	9	2%
2 per du	284	78%
2.25 per du	1	0%
2.3 per du	1	0%
3 per du	6	2%
4 per du	7	2%
Total	**365**	

Source: Survey of Regulatory Standards, CPW 2006

About 4% of the jurisdictions based their requirement on the number of bedrooms. In general, the more bedrooms, the greater the requirements for off-street parking. In half of these cases, the minimum number of off-street parking spaces was two. In the remaining cases, the minimum requirement was one or 1.5 spaces.

Table 3-11 shows statistical comparisons between off-street parking requirements within five subcomponents of the sample. A significance level of less than 0.05 is considered significant. If the significance level is less than 0.05, we have entered "yes" in the "statistically significant difference" column, and if it is greater than 0.05, we have entered "no."

Differences were significant for the following subcomponents: central city and population quartiles. In other words, the number of off-street parking spaces required varies, depending on whether the jurisdiction is a central city and what the population quartile is. Additional ANOVA testing shows that jurisdictions in the fourth quartile of population (having the largest populations) require less off-street parking than jurisdictions in the second population quartile.

Table 3-11. Statistical comparisons of the number of off-street parking spaces for jurisdictions grouped by subcomponents of the sample

	Statistically significant difference	Significance level
Government type	No	0.804
Census region	No	0.556
Part of MSA / Not part of MSA	No	0.622
Central city / Not central city	Yes	0.000
U.S. Population grouped in quartiles	Yes	0.011

Source: Survey of Regulatory Standards, CPW 2006

LANDSCAPING STANDARDS

Many jurisdictions include landscaping standards in their ordinances. Landscaping standards vary by jurisdiction and the type of development. We were concerned with landscaping standards related to residential subdivisions and residential zones, especially the residential zone we examined.

Landscaping requirements vary in several ways. First, landscaping requirements vary in the amount of landscaping required. Some jurisdictions require extensive landscaping and others require less landscaping. Secondly, ordinances vary in the level of detail about landscaping requirements. Some jurisdictions' ordinances have general language about landscaping requirements and its locations. Other ordinances have very specific requirements about the types, locations, and size of the plants in the landscaping. Finally, different types of landscaping may be required in different circumstances. For example, street trees may be required along streets and other types of landscaping may be required at the entrance to a subdivision.

Quantifying these standards would pose significant difficulties. As a result, we chose to track whether ordinances contain landscaping standards for development of residential subdivisions or development in the zoning district that we reviewed. Table 3-12 shows that 42% of the jurisdictions in the study had landscaping requirements.

Table 3-12. Requirements of landscaping

	Frequency	Percent
Required standards	195	42%
No standards required*	274	58%

Source: Survey of Regulatory Standards, CPW 2006,

*Note: We found no landscaping standards for these jurisdictions in the ordinances we reviewed but they may have required landscaping standards in other ordinances.

Table 3-13 shows that we found landscaping standards in both subdivision and zoning ordinances. The total number of ordinances that we found landscaping standards in is larger than the total number of jurisdictions that required landscaping because some ordinances said that landscaping *may* be required under some circumstances, such as trees along certain streets or in parking lots, in swales or other drainage areas, or at the entrance to the subdivision.

Table 3-13. Ordinances that specified landscaping standards

	Frequency	Percent
Subdivision	122	47%
Zoning	83	32%
Both	53	21%
Total	**258**	

Source: Survey of Regulatory Standards, CPW 2006

Table 3-14 shows statistical comparisons on whether jurisdictions require landscaping within the five subcomponents of the sample. A significance level of less than 0.05 is considered significant. If the significance level is less than 0.05, we have entered "yes" in the "statistically significant difference" column, and if it is greater than 0.05, we have entered "no."

Differences in landscaping requirements were significant for Census regions, whether the jurisdiction is part of an MSA, and the jurisdiction's population. We did not perform an ANOVA test for landscaping because landscaping had two possible values (yes or no) and the ANOVA requires three or more possible values (i.e. yes, no, or maybe).

Table 3-14. Statistical comparisons of landscaping requirements for jurisdictions grouped by subcomponents of the sample

	Statistically significant difference	Significance level
Government type	No	0.054
Census region	Yes	0.002
Part of MSA / Not part of MSA	Yes	0.018
Central city / Not central city	No	0.783
U.S. Population grouped in quartiles	Yes	0.000

Source: Survey of Regulatory Standards, CPW 2006

The following are some examples of landscaping requirements, quoted from several different ordinances. The examples are fragments of the landscaping standard, related to one type of development.

1. All lots shall be planted with grass or other suitable ground cover approved by the Planning Board, from the roadside edge of the unpaved right-of-way back to a distance of 25 feet behind the principal residence on the lot.[7]

2. A minimum of two (2) trees shall be required per single or two-family residential lot. The trees shall be placed in the front yard area at least ten (10) feet from the curb line. On corner lots and cul-de-sac lots, one of the trees may be placed in the side yard area. All remaining lot area not used for structures, parking area, or driveway shall be landscaped with turf grass, native grasses, ground cover, or other perennial flowering plants, vines, shrubs, or trees.[8]

3. All single-family developments will have one tree per 40 lineal feet, or fraction thereof. These trees will be located in the swale (green) area in between the roads edge and the sidewalks. Trees that are located in swales that are six to eight foot in width will require the use of a root barrier to protect the sidewalk from root damage. The root barrier will be installed per the manufacturer's recommendation. In right-of-ways with less than a six-foot swale area the street trees will be located in the front yard five feet from the sidewalk and a root barrier will be used along the sidewalk adjacent to the tree.[9]

4. Single-family residential landscaping requirements.

    a. These standards shall apply to all detached and attached single-family residential districts. These standards may be met by saving existing trees on the site or planting new trees from the approved list. Lot size designations shall apply to the zoning classification(s) of the subdivision rather than to each individual lot.

    b. One shade tree (2.5" caliper minimum) shall be provided for all single-family residential lots less than 6,000 square feet.

    c. Two shade trees (2.5" caliper minimum) shall be provided for all single-family residential lots of 6,000 square feet to less than 9,000 square feet.

    d. Three shade trees (2.5" caliper minimum) shall be provided for all single-family residential lots of 9,000 square feet or more.

[7] Millbrook Village, NY subdivision ordinance, p 21.

[8] Faribault, MN subdivision ordinance, chapter 4.

[9] Pembroke Pines, FL code of ordinances Title XV, Section 153, Section 153.19.

e. All required trees must be planted prior to request for final building inspection of dwelling units. [10]

OPEN SPACE STANDARDS

Open space standards refer to land that is undeveloped and devoted to public uses, such as parkland. About 28% or 133 of the jurisdictions in the sample had regulations requiring dedication of land for open space uses. Of these jurisdictions, 59% or 78 jurisdictions allowed payments (fee-in-lieu) of land dedications. These requirements were most often found in the subdivision ordinance.

While open space requirements do not vary as much as landscaping standards, the types of open space requirements do vary substantially. We found three common standards for dedicating land to open space in new development: a percentage of the total land in a subdivision, a number of square feet per dwelling unit, and a number of square feet per person. Ninety-nine of the 133 jurisdictions that with open space requirements used one of these three methods for specifying the amount of open space required. Table 3-15 provides a statistical summary of these standards, which we will discuss below.

Table 3-15. Statistical summary of different standards for requiring open space

Open space standard	N	Mean	Median	Mode	Standard deviation	Minimum	Maximum
Percent of total land in subdivision	47	13	10	10	9.0	3	50
Number of square feet per dwelling unit	18	1,562	795	871	3,446.9	310	15,246
Number of square feet per person	34	229	218	218	112.0	87	436

Source: Survey of Regulatory Standards, CPW 2006

The most common method for establishing the amount of open space for new residential development is requiring dedication of a percentage of land within the subdivision for open space. Table 3-15 shows that 47 or 47% of jurisdictions with open space standards use this method of calculating open space requirements. The mean percentage of total land required for open space in a new subdivision is 13% and the median is 10%, with a standard deviation of 9%. The smallest requirement is 3% and the greatest requirement is for 50% of the land in a subdivision.

Table 3-16 shows a breakdown of the amount of land required for open space. Sixty percent of the jurisdictions using this method require between 10% and 19% of the land in the subdivision for open space. Twenty-one percent of jurisdictions require dedications of 20% or more of the land in the subdivision for open space. Nineteen percent of jurisdictions require that a minimum of 9% or less of the land in the subdivision is dedicated to open space.

[10] Lewisville, TX General Development Ordinance Chapter 6, Article VI, Section 6-122.

Table 3-16. Percent of land in a subdivision required for open space

	Frequency	% of jurisdictions	Percent of all jurisdictions
9% of land or less	9	19%	2%
10% to 19% of land	28	60%	6%
20% or more of land	10	21%	2%
Total	**47**	**100%**	**10%**

Source: Survey of Regulatory Standards, CPW 2006

Another method for calculating the amount of land to dedicate to open space is based on the number of dwelling units in the subdivision, with requirements for a specific amount of land for open space per dwelling unit. Table 3-15 shows that 18 jurisdictions use this method of calculation. The mean number of square feet of land per dwelling unit is 1,562, and the median amount is 795 square feet of land per dwelling unit, with a standard deviation of 3,447 square feet of land per dwelling unit. The smallest amount of land is 310 square feet and the largest is 15,246 square feet per dwelling unit.

Table 3-17 presents a breakdown by percent of jurisdictions of the number of square feet of land per dwelling unit required for open space. It shows the variability in the amount of land required per dwelling unit. Forty-four percent of jurisdictions require a minimum of 500 or fewer square feet per dwelling unit. An equal number of jurisdictions require 500 to 999 square feet per dwelling unit or more than 1,000 square feet per dwelling unit.

Table 3-17. Number of square feet per dwelling unit required for open space

	Frequency	% of jurisdictions	Percent of all jurisdictions
Fewer than 500 square feet per du	8	44%	2%
500 to 999 square feet per du	5	28%	1%
More than 1,000 square feet per du	5	28%	1%
Total	**18**	**100%**	**4%**

Source: Survey of Regulatory Standards, CPW 2006

The third method for calculating open space requirements is based on the number residents in the subdivision, with dedications of a certain number of square feet per resident. Table 3-15 shows that 34 jurisdictions, 34% of the jurisdictions who require open space, use this method. The mean amount of land required in this method is 229 square feet per person, and the median is 218 square feet per person, with a standard deviation of 112 square feet per person. The smallest amount of land required is 87 square feet per person, and the largest is 436 square feet per person.

Table 3-18 shows a breakdown of the amount of land required for open space per resident. Seventy-six percent of jurisdictions require either fewer than 200 square feet of land per person or 200 to 299 square feet of land per person.

Table 3-18. Number of square feet per person required for open space

	Frequency	% of jurisdictions	Percent of all jurisdictions
Fewer than 200 square feet per person	13	38%	3%
200 to 299 square feet per person	13	38%	3%
300 to 399 square feet per person	3	9%	1%
More than 400 square feet per person	5	15%	1%
Total	**34**	**100%**	**7%**

Source: Survey of Regulatory Standards, CPW 2006

One-hundred thirty-three of the jurisdictions in the sample had open space requirements. Table 3-19 shows statistical comparisons on whether jurisdictions require open space within the five subcomponents of the sample. A significance level of less than 0.05 is considered significant. If the significance level is less than 0.05, we have entered "yes" in the "statistically significant difference" column, and if it is greater than 0.05, we have entered "no."

Differences in landscaping requirements were significant for Census regions. We did not perform an ANOVA test for requiring open space because requiring open space had two possible values (yes or no) and the ANOVA requires three or more possible values (i.e. yes, no, or maybe).

Table 3-19. Statistical comparisons of landscaping requirements for jurisdictions grouped by subcomponents of the sample

	Statistically significant difference	Significance level
Government type	No	0.216
Census region	Yes	0.003
Part of MSA / Not part of MSA	No	0.058
Central city / Not central city	No	0.460
U.S. Population grouped in quartiles	No	0.200

Source: Survey of Regulatory Standards, CPW 2006

SIDEWALK STANDARDS

One of the most commonly required improvements in new residential development is sidewalks. This section includes information collected in the study about sidewalks, planting strips, and curbs.

In our review, we kept track of the jurisdictions that explicitly require sidewalks in either their subdivision or zoning ordinances. A number of other jurisdictions implied that sidewalks might be required or stated that they would be required under certain circumstances. We did not count these jurisdictions as requiring sidewalks, even though it is possible that they do.

Fifty-one percent of the jurisdictions in the study explicitly require sidewalks. These requirements are most frequently found in the subdivision ordinances. Table 3-20 shows that sidewalks are required on both sides of the street in 51% of the jurisdictions with

sidewalk standards. Fourteen percent of jurisdictions with sidewalk standards require them on one side of the street and the remaining jurisdictions do not specify where sidewalks are required.

Table 3-20. Where sidewalks are required

	Frequency	% of jurisdictions	Percent of all jurisdictions
One side	33	14%	7%
Both sides	123	51%	26%
Unspecified	85	35%	18%
Not required	228	N/A	49%

Source: Survey of Regulatory Standards, CPW 2006

Table 3-21 provides a summary of required sidewalk width and planting strip width. Thirty-three percent of jurisdictions in the study had a minimum sidewalk width. The mean and median sidewalk width is four feet, with a standard deviation of one foot. The smallest requirement is three feet and the largest requirement is 10 feet.

Table 3-21. Summary of statistical standards for sidewalks, in feet

Street standard	N	Mean	Median	Mode	Standard deviation	Minimum	Maximum
Sidewalk width	153	4	4	4	1	3	10
Planting strip width	37	5	5	5	1	2	8

Source: Survey of Regulatory Standards, CPW 2006

Table 3-22 shows a distribution of sidewalk widths. It shows that 59% of jurisdictions with sidewalk width standards require sidewalks of at least four feet wide. Thirty-one percent require sidewalks at least five feet wide.

Table 3-22. Minimum required sidewalk width

	Frequency	% of jurisdictions	Percent of all jurisdictions
3 ft.	2	1%	0%
4 ft.	91	59%	19%
4.5 ft.	4	3%	1%
5 ft.	48	31%	10%
6 ft.	4	3%	1%
More than 6 ft.	4	3%	1%
Total	**153**	**100%**	**33%**

Source: Survey of Regulatory Standards, CPW 2006

Table 3-23 shows statistical comparisons between whether sidewalks are required and five subcomponents of the sample. A significance level of less than 0.05 is considered significant. If the significance level is less than 0.05, we have entered "yes" in the "statistically significant difference" column, and if it is greater than 0.05, we have entered "no."

Differences were significant for government type, whether the jurisdiction is part of an MSA, and the jurisdiction's population. Sidewalk requirements were not significantly different for jurisdictions grouped by region or whether the jurisdiction is a central city.

Table 3-23. Statistical comparisons of whether sidewalks are required for jurisdictions grouped by subcomponents of the sample

	Statistically significant difference	Significance level
Government type	Yes	0.007
Census region	No	0.096
Part of MSA / Not part of MSA	Yes	0.000
Central city / Not central city	No	0.143
U.S. Population grouped in quartiles	Yes	0.001

Source: Survey of Regulatory Standards, CPW 2006

Table 3-24 shows statistical comparisons between sidewalk widths and five subcomponents of the sample. A significance level of less than 0.05 is considered significant. If the significance level is less than 0.05, we have entered "yes" in the "statistically significant difference" column, and if it is greater than 0.05, we have entered "no."

Differences in sidewalk widths are not significant for any of the five groupings of jurisdictions. This means that sidewalk width does not vary significantly based on these subcomponents of the sample.

Table 3-24. Statistical comparisons of sidewalk widths for jurisdictions grouped by subcomponents of the sample

	Statistically significant difference	Significance level
Government type	No	0.841
Census region	No	0.060
Part of MSA / Not part of MSA	No	0.565
Central city / Not central city	No	0.156
U.S. Population grouped in quartiles	No	0.251

Source: Survey of Regulatory Standards, CPW 2006

Table 3-25 shows statistical comparisons between the number of sides of the street that sidewalks are required on and five subcomponents of the sample. A significance level of less than 0.05 is considered significant. If the significance level is less than 0.05, we have entered "yes" in the "statistically significant difference" column, and if it is greater than 0.05, we have entered "no."

Statistical comparison sidewalk widths are not significant for groupings of jurisdictions, except for region. The ANOVA test shows that there is no significant difference in sidewalk widths within the subcomponents of the sample.

Table 3-25. Statistical comparisons of the number of sides of the street that sidewalk are required on for jurisdictions grouped by subcomponents of the sample

	Statistically significant difference	Significance level
Government type	No	0.856
Census region	Yes	0.040
Part of MSA / Not part of MSA	No	0.638
Central city / Not central city	No	0.400
U.S. Population grouped in quartiles	No	0.831

Source: Survey of Regulatory Standards, CPW 2006

Table 3-21 shows that 37 (8%) jurisdictions in the study have requirements for planting strips, a grassy buffer between the sidewalk and the curb The mean and median width of the strip was five feet, with a one-foot standard deviation. The smallest width requirement was two feet and the largest was eight feet.

Table 3-26 shows the distribution of planting strip minimum widths. Of the jurisdictions with planting strip width standards, 30% required five foot wide planting strips and 19% of jurisdictions required either four foot or six foot planting strips.

Table 3-26. Minimum width for planting strip

	Frequency	% of jurisdictions	Percent of all jurisdictions
2 ft.	4	11%	1%
3 ft.	4	11%	1%
3.5 ft.	1	3%	0%
4 ft.	7	19%	1%
5 ft.	11	30%	2%
6 ft.	7	19%	1%
7 ft.	2	5%	0%
8 ft.	1	3%	0%
Total	**37**	**100%**	**8%**

Source: Survey of Regulatory Standards, CPW 2006

Another commonly required improvement in new residential development is curbs and gutters. Like sidewalks, we recorded the jurisdictions that explicitly require curbs and gutters in either their subdivision or zoning ordinances. A number of jurisdictions implied that curbs and gutters were required improvements or may be required. We did not count these jurisdictions as requiring curbs and gutters, even though it is possible that they do.

Curbs and gutters were required by 234 or 50% of the jurisdictions in the study. We found most of the requirements in the subdivision ordinance.

STREET VARIABLES

Streets are an essential improvement in residential development. In this study we collected information about minimum pavement width and minimum street right-of-way width. When we found these standards they were in the subdivision ordinances 92% of the time.

Table 3-27 provides a summary of pavement and right-of-way widths. Forty-one percent of the jurisdictions in the study had minimum pavement widths in their subdivision or zoning ordinances. The mean and median minimum pavement width was 28 feet, with a standard deviation of six feet. The smallest minimum pavement width was 16 feet and the largest minimum pavement width was 45 feet.

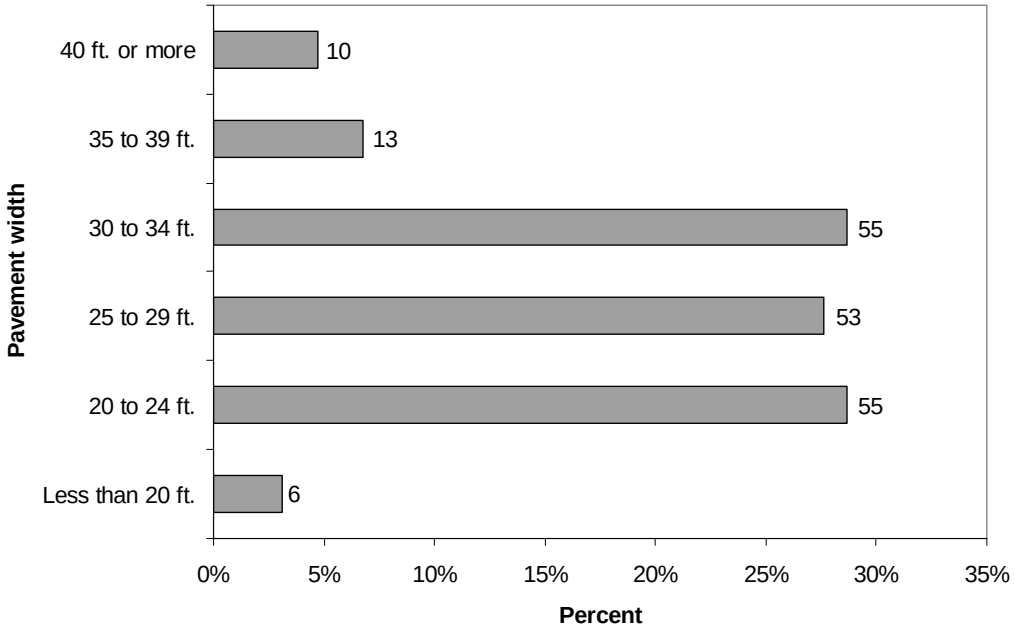
Table 3-27. Statistical summary of minimum street pavement and right-of-way widths

Street standard	N	Mean	Median	Mode	Standard deviation	Minimum	Maximum
Street pavement width	192	28	28	30	6	16	45
Street right-of-way width	262	52	50	50	8	20	80

Source: Survey of Regulatory Standards, CPW 2006

Figure 3-5 shows minimum pavement width, grouped in increments of five feet. The majority of jurisdictions' standards were divided between 20 to 24 feet wide, 25 to 29 feet wide, and 30 to 34 feet wide. Three percent of jurisdictions with this standard allowed streets in new residential development that are less than 20 feet wide and 6% required pavement widths of 40 feet or greater.

Figure 3-5. Minimum pavement width percentage and frequency, grouped in 5-foot increments



Source: Survey of Regulatory Standards, CPW 2006

Table 3-28 shows statistical comparisons between pavement width and five subcomponents of the sample. A significance level of less than 0.05 is considered significant. If the significance level is less than 0.05, we have entered "yes" in the "statistically significant difference" column, and if it is greater than 0.05, we have entered "no." Differences in pavement width were significant for each of the five subcomponents of the sample.

Table 3-28. Statistical comparisons of pavement widths for jurisdictions grouped by subcomponents of the sample

	Statistically significant difference	Significance level
Government type	Yes	0.001
Census region	Yes	0.000
Part of MSA / Not part of MSA	Yes	0.050
Central city / Not central city	Yes	0.046
U.S. Population grouped in quartiles	Yes	0.021

Source: Survey of Regulatory Standards, CPW 2006

Additional statistical testing showed the differences in pavement widths within subcomponents of the sample. The tests showed differences within government type and census region, indicating that pavement widths vary significantly by government type and Census region. Although the chi-square statistical test indicated that pavement width are statistically different by population quartiles, additional post-hoc statistical

testing indicates that there are no significant differences in pavement widths for population quartiles. Pavement widths vary within each subcomponent in the following ways:

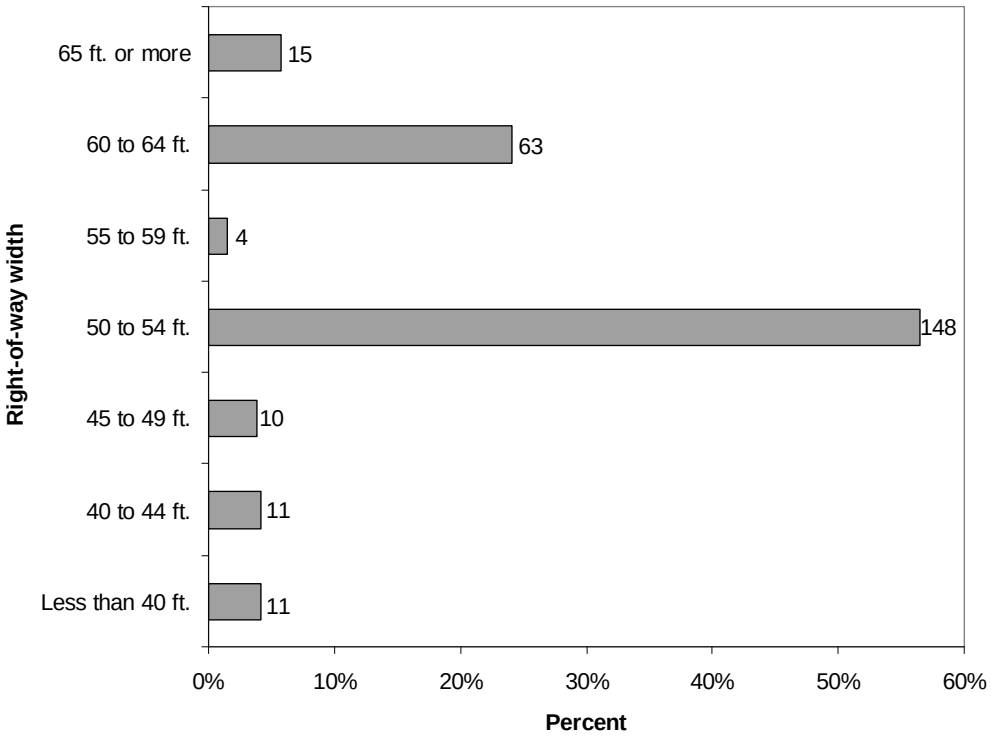
- **Government type.** Cities have the largest average pavement widths of any government type. This difference in pavement widths is significant between cities and towns.

- **Census region.** Pavement widths are statistically different between the West and the Northeast and South. The West has larger average pavement widths.

- **U.S. Population.** There are no significant differences in pavement widths when analyzed by population quartiles.

Table 3-27 shows that 262 or 56% of jurisdictions had minimum right-of-way widths in their ordinances. The mean right-of-way was 52 feet and the median was 50 feet, with a standard deviation of 8 feet. The smallest right-of-way width was 20 feet and the largest was 80 feet.
Figure 3-6 shows the distribution of street right-of-way widths in five-foot increments. Fifty-six percent of jurisdictions with this standard require right-of-ways no smaller than 50 to 54 feet, and 24% of jurisdictions require right-of-ways at least 60 to 64 feet wide. Four percent of jurisdictions' minimum right-of-way width is less than 40 feet, and 6% have a minimum of 65 feet or more.

Figure 3-6. Minimum right-of-way width percentage and frequency, grouped in 5-foot increments



Source: Survey of Regulatory Standards, CPW 2006

Table 3-29 shows statistical comparisons between street right-of-way widths and five subcomponents of the sample. A significance level of less than 0.05 is considered significant. If the significance level is less than 0.05, we have entered "yes" in the "statistically significant difference" column, and if it is greater than 0.05, we have entered "no."

Statistical comparisons of right-of-way widths were significant for jurisdictions grouped by region. Street right-of-way widths did not vary significantly based on government type, whether the jurisdiction is part of an MSA, whether the jurisdiction is a central city, or the jurisdiction's population.

Table 3-29. Statistical comparisons of street right-of-way width for jurisdictions grouped by subcomponents of the sample

	Statistically significant difference	Significance level
Government type	No	0.903
Census region	Yes	0.000
Part of MSA / Not part of MSA	No	0.233
Central city / Not central city	No	0.323
U.S. Population grouped in quartiles	No	0.387

Source: Survey of Regulatory Standards, CPW 2006

Additional statistical testing shows that street right-of-way widths are statistically different between the Midwest and all other regions. The Midwest has larger average right-of-way widths than the other regions. This reinforces the conclusion that right-of-way width varied significantly by region.

OBSERVATIONS

This chapter presents a few observations about the data collection phase of the study. The focus of this phase of the study was gathering data and presenting a descriptive analysis of the data. This majority of the conclusions from the study will come from the cost analysis portion of the study. Our observations about the data and data collection are as follows.

Most jurisdictions regulated one or more of the variables. Ninety-four percent of the jurisdictions in the sample had standards for one or more of the study variables. More than three-quarters of the jurisdictions had standards for lot size, front setbacks, and off-street parking spaces. About one-fifth of the jurisdictions had standards for open space and floor area.

The population varied among jurisdictions. The size of jurisdictions within the sample varied substantially. They ranged in population from 9.5 million people to 132 people, from some of the largest cities and most densely developed counties in the U.S. to small rural towns. These differences presented challenges in analyzing the regulatory standards. We addressed these challenges by separating the sample into population quartiles and comparing regulatory standards among the quartiles.

Some of the variables had a broad range of values. The basic statistical analysis showed that several of the variables had substantial variation. The following variables had a large range of values and large standard deviation compared to their mean: lot size, lot width, front setback, side setback, and open space. For example, a rural jurisdiction is likely to have larger minimum requirements for lot size and lot width than an urban city. We addressed these differences by separating the sample subcomponents and comparing regulatory standards within the subcomponent groupings. The subcomponents included government type, census region, membership in a Metropolitan Statistical Area (MSA), and central city.

Difficulty in obtaining ordinances. Obtaining ordinances was difficult, especially with smaller jurisdictions. Some jurisdictions made their ordinances available via the Internet, making it easy to get their ordinances. Where the ordinance was only available directly from the jurisdiction, we were more likely to have problems getting the ordinances. Some jurisdictions were unresponsive to our phone calls and requests for ordinances, resulting in their exclusion from the sample.

Choice of Review Variables

This appendix summarizes the process for choosing variables for the database. It includes our reasoning for choosing particular variables, as well as the list of variables for the study.

PROCESS FOR CHOOSING VARIABLES

The entire team participated in choosing the variables for reviewing the ordinances, including representatives from the NAHB, ECONorthwest, and CPW. This process took several weeks and was documented in several memorandums, which are summarized in this appendix.

We began the project with a list of about 75 variables that we considered including in this study. We narrowed the list of variables by reviewing ordinances from ten jurisdictions to assess whether subdivision ordinances commonly contained the standards in our list. We found that many of site-specific variables in our original list were not in the initial ten ordinances.

At that point, we began considering expanding the scope of the project to include some variables from zoning ordinances because our research indicated that these variables, especially those related to lot size, have substantial impact on housing costs. As a result of the decision to include variables from zoning ordinances, we reduced our sample size from 1,100 jurisdictions to 400 jurisdictions[11].

We reduced the number of variables to about fifteen and conducted a second review of ten jurisdictions' subdivision and zoning ordinances to determine how frequently these variables occurred in the ordinances. This review showed that the variables in our list were frequently found.

We finalized our list of variables, based on the following criteria:

- **Likelihood and ease of finding the variables within a zoning or subdivision ordinance.** A number of the variables that we were originally interested in measuring were not generally found in either of these ordinances. For example, the minimum diameter of a sewer lateral or street pavement surface thickness were not often found in either the zoning or subdivision ordinances.
- **Ease of measuring the variables.** Some of the variables that we considered were difficult to measure. For example, landscaping standards vary substantially among ordinances. We were unable to find a way to quantify such diverse standards. Instead, we chose to collect whether or not each jurisdiction had landscaping requirements in their zoning or subdivision ordinances.
- **Expected impact of the variable on housing cost.** Some of the variables that we had originally considered including in the study probably had minimal impact on the cost of housing. For example, many of the jurisdictions in our preliminary review

[11] Ordinance review and collection took less resources than we initially thought, and we were able to increase the sample size. We ultimately reviewed 469 ordinances.

contained standards for the angle of street intersections but the angle of an intersection probably has little impact on the cost of housing in a subdivision.

The variables that we selected for review included:

- Lot-width minimums
- Lot-size minimums
- Yard setback minimums (front yard, side yards, rear yard)
- Floor area minimums
- Off-street parking requirements
- Curb and gutter requirements
- Minimum street right-of-way width
- Minimum pavement width
- Sidewalk requirements
- Open space requirements
- Landscaping requirements

As we began ordinance review, we added several variables to address administrative concerns. These variables gave us information about the ordinances themselves and allowed for certain types of comparison between ordinances. They include:

- The type(s) of ordinance: zoning and/or subdivision
- Last update for each ordinance
- Type of update (adopted or amended)
- Ordinance media (electronic or paper)
- Name of the zoning district used for review
- Type of quality assurance review (short check or long check)

The next step was quantifying each variable and building the data collection database.